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# Weather Summaries for Coram Experimental Forest, Northwestern Montana —an International Biosphere Reserve

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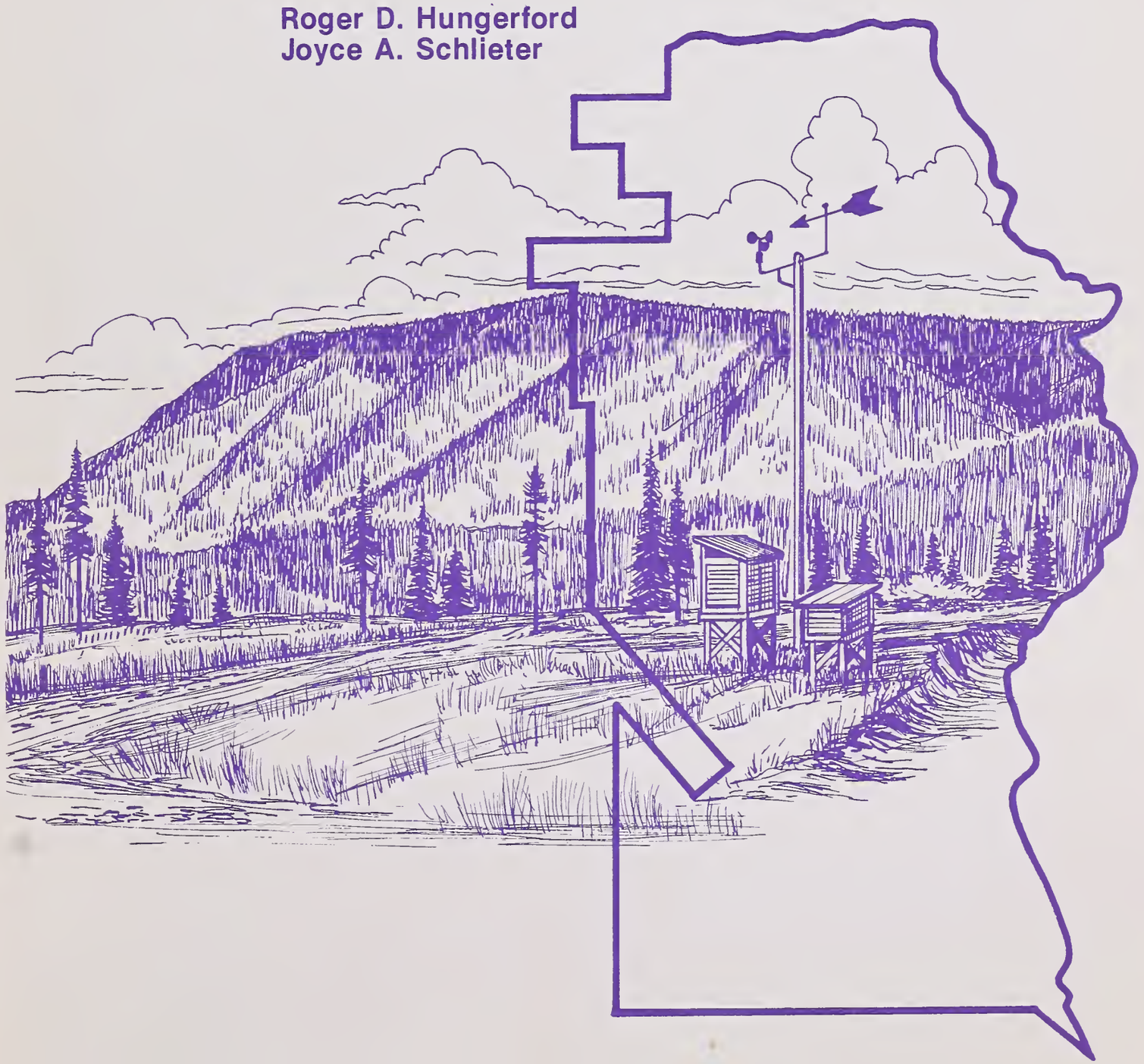

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## ACKNOWLEDGMENTS

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## RESEARCH SUMMARY

The Coram Experimental Forest, 28 miles (45 km) east of Kalispell, Mont., and 5 miles (8 km) south of Glacier National Park, occupies 7,460 acres (3 019 ha) on the Flathead National Forest. It was designated an experimental forest of the western larch/Douglas-fir type in 1933. Research was initiated in the late 1940's, and it became a Biosphere Reserve in 1976. Weather data have been recorded at 18 locations for varying periods of time. The earliest location near the Forest was established at the Coram Ranger Station in 1926. Data are still being obtained at seven locations.

Air temperature, precipitation, and relative humidity data have been collected at most of the stations. The remaining stations were established to measure differences in soil temperature and microsite treatment. Several of the stations were instrumented to record solar and net irradiance, wind, soil heat flux, evaporation, and soil temperature for various depths. The latter data were part of a residue utilization study in the 1970's. Because data were inadequate for analysis, relative humidity, soil heat flux, and evaporation will not be presented.

Mean annual temperatures on the forest range from 36° to 45° F (2° to 7° C), with mean summer temperatures of 55° to 62° F (13° to 17° C). Maximum temperatures seldom exceed 100° F (38° C). Winter temperatures typically fall below 0° F (–18° C), but rarely lower than –20° F (–29° C). Minimum temperatures are dramatically influenced by topographic features, as illustrated by differences of 60 to 90 frost-free days.

Annual precipitation averages 33 inches (84 cm) at lower elevations and increases to about 40 inches (102 cm) at the highest elevations. Summer precipitation is similar at all locations.

Mean annual soil temperatures at the 20-inch (50.8-cm) depth average from 39° to 43° F (4° to 6° C), with mean summer temperatures from 50° to 53° F (10° to 12° C). Litter surface temperatures on unvegetated clearcuts often reach 140° F (60° C) or more for several hours at a time.

This report brings together weather data summaries for most of the stations within the Forest. Several adjacent long-term stations are also included for comparison. These data provide excellent opportunities for interpreting results of silvicultural and other biological research, particularly in describing climatological variations associated with forest growth and productivity. Topographic features, periods of record, types of data collected, habitat types, and vegetation conditions are included for each weather station.

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## INTRODUCTION

Weather—the daily variations in atmospheric conditions—and climate—long-term atmospheric trends—play an important role in forested environments and attendant biological processes. Weather influences events such as seedling survival, seed crop and dispersal, calf elk survival, and the spread of diseases and insects; climate influences the species of trees present and their growth rates. Local weather and climate are determined by regional air masses, modified by topography. Man's activities—logging, wildfire, and prescribed burning—can affect the microclimate (conditions close to the ground), to the benefit or detriment of forest management.

Weather data on the Coram Experimental Forest have been recorded in conjunction with several short-term studies. In addition, long-term records exist for several stations adjacent to the Forest. The records are valuable for reference, along with other information, in explaining seedling success, stand development, and other forest events. The data also will aid in interpreting results of current and future studies on the Forest and will be useful for ecological modeling. Because results of most studies on the Forest are applicable to other western larch (Type 212) stands, weather records provide a means of extrapolating results to similar sites. Biological consequences and the corresponding environmental conditions can be used in conjunction with weather data on other sites.

Our objective is to present a compendium of weather summary tables for the Coram Experimental Forest and several adjacent weather stations in one document. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has recognized the Forest as a Biosphere Reserve to be managed to show and document the effect of man's activities on the ecosystem serving research and education (Franklin 1977). This report should be useful for interpreting results of silvicultural studies and other research. These data summaries also provide a unique opportunity to examine local weather variations in mountainous terrain. Habitat types are described for each site. Among other things, this will enable the reader to compare variations of microclimates within a habitat type.

Because many of the weather stations were operated only during the summer months, or because of the relatively short duration of the data-taking period, the weather summaries presented in the appendix do not lend themselves to detailed or long-term climatological studies. Nevertheless, the data are useful for general observations and comparisons within the Forest, several of which are offered in this report.

## CORAM EXPERIMENTAL FOREST

### General Description

The Coram Experimental Forest (fig. 1) is located off Highway 2 at Martin City, 28 miles (45 km) east of Kalispell, Mont. Glacier National Park is approximately 5 miles (8 km) north of the northern boundary of the Forest. Abbott Creek and its south fork are the major drainages and are oriented in a north-south direction until the main fork reaches gentler terrain and approaches the western boundary of the Forest. Ridges run north-south, with the eastern boundary a major ridge. As a result, aspects are generally east or west. Slopes range from nearly flat at the western edge of the Forest (3,500 feet [1 067 m]) to steep (60 to 70 percent) along upper Abbott Creek and the ridge up to the eastern boundary. The highest point is Desert Mountain at 6,370 feet (1941 m).

Timber stands are primarily even-aged western larch (*Larix occidentalis* Nutt.) and Douglas-fir (*Pseudotsuga menziesii* var. *glauca* [Beissn.] Franco), with two-thirds being mature. The stands are intermediate in productive capacity; mature stands contain 15,000 to 25,000 board feet per acre. Habitat types include *Pseudotsuga menziesii/Physocarpus malvaceus-Physocarpus malvaceus* phase; *Tsuga heterophylla/Clintonia uniflora-Aralia nudicaulis* phase; *Abies lasiocarpa/Oplopanax horridum; Abies lasiocarpa/Clintonia uniflora-Clintonia uniflora* phase; *Abies lasiocarpa/Clintonia uniflora-Aralia nudicaulis* phase; *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase; and *Abies lasiocarpa/*

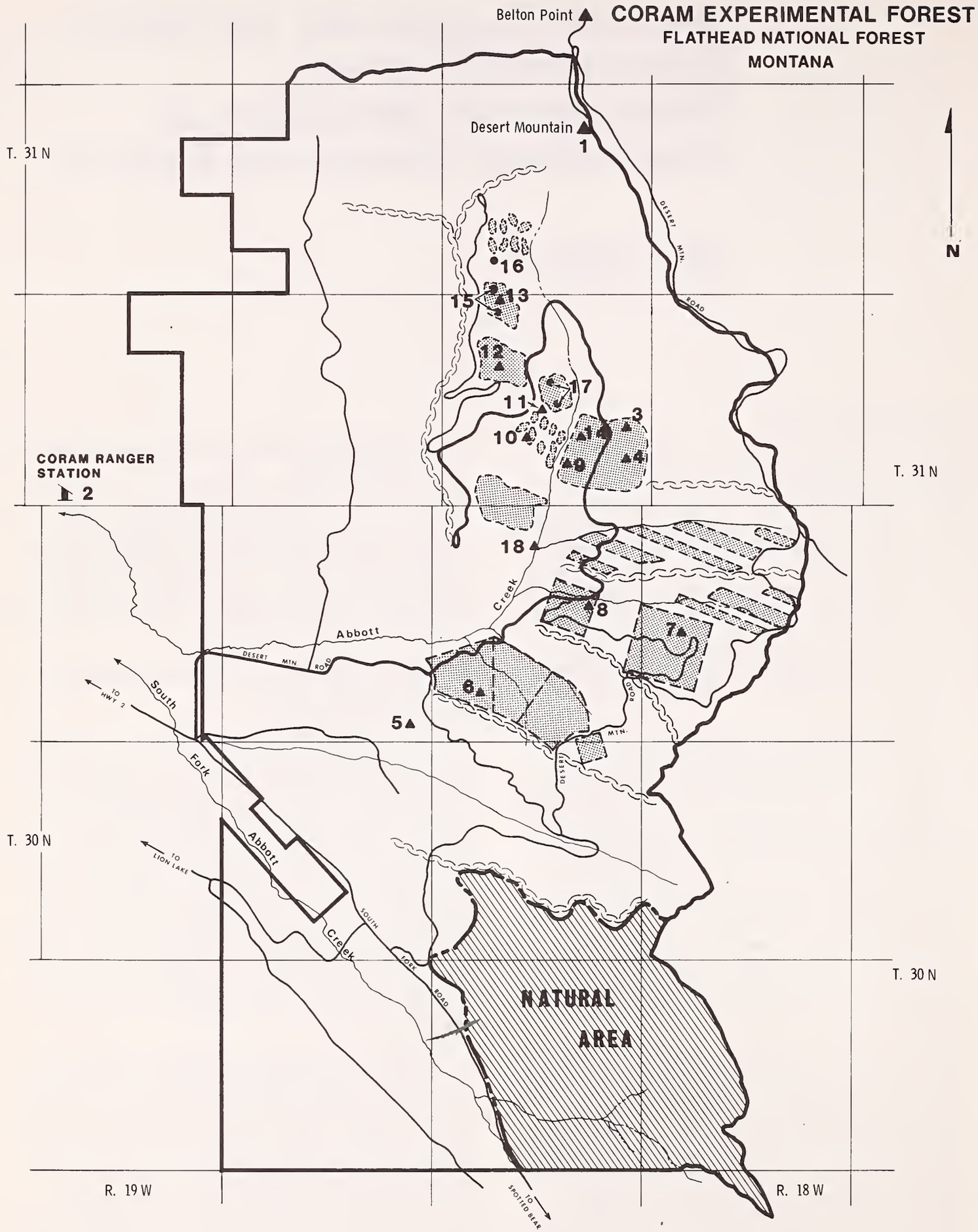


Figure 1.—Coram Experimental Forest, showing locations of climatic sites on the forest and adjacent long-term sites.

*Clintonia uniflora-Menziesia ferruginea* phase (Pfister and others 1977).

Soils are typical of those in the Northern Rockies, being derived from argillite and quartzite with glacial outwash and till deposited on the lower areas. Klages and others (1976) described the soils of the Forest.

## Weather Stations

Within the Forest, and at the Coram Ranger Station, 13 of the 18 sites (numbers 1-13, fig. 1) have recorded air temperature, relative humidity, and precipitation. Unfortunately these stations were not all running concurrently, which makes it difficult to compare sites (table 1). Some of these (3-8, fig. 1, and table 1) operated during different silvicultural studies at different times. The others (9-13, fig. 1) were operated during a residue utilization and harvesting study conducted 1974-81. These are termed the residue utilization study sites (also include numbers 14-18).

Soil temperature was measured for varying periods and microsites at stations 10-17. Solar and net irradiance, wind, evaporation, and soil heat flux were measured at 10-13 and solar irradiance at 9. Precipitation was also recorded on a year-round basis at 14. For several years precipitation was measured using rain cans at numerous locations around the residue utilization study sites. These data are not included in this report, but are available on request.

Coram Ranger Station and Desert Mountain Lookout, representing the lowest to highest elevations (fig. 1), provide long-term records for portions of the year. Coram Ranger Station was discontinued in 1957 prior to most research on the Forest; Desert Mountain Lookout was terminated in 1973. Fire weather data are now measured at the Hungry Horse Ranger Station (3 miles [5 km] west of the Forest) and at Firefighter Mountain (5 miles [8 km] southeast of the Forest) but these data are not presented. A Soil Conservation Service snow measurement site is located about 1½ miles (2 km) east of Desert Mountain and records air temperature, precipitation, and snow depth, but we have not included SCS data in this report.

Long-term climatic data summaries for West Glacier and Hungry Horse Dam are presented. Both of these stations are considered to represent weather in the major valley bottoms. West Glacier is located 5 miles (8 km) north; Hungry Horse Dam, 1 mile (1.6 km) south of the Forest (fig. 1).

Original records, summaries, or computer data bases are available at the Forestry Sciences Laboratory, Missoula, for all the weather stations shown in figure 1.

## Instrumentation

Climatic stations on the Forest using Cotton region shelters were fitted with hygrothermographs for measuring air temperature and relative humidity. In 1978 these instruments at stations 10, 12, and 13 were replaced by thermistor sensors attached to a cassette tape data acquisition system. Calibration procedures for temperature gave us accuracies of ±2° F (1° C). Precipitation has been measured with standard rain gages, weighing gages, or tipping bucket gages. The Hungry Horse Dam and West Glacier stations used maximum and minimum thermometers for measuring air temperature, sling psychrometer readings for relative humidity, and standard rain gages for precipitation. Solar irradiance

**Table 1.**—Weather station periods of record and type of data collected

| | Station | Length | Period | Data |
|---|---|---|---|---|
| 1 | Desert Mountain Lookout | 1936-73 | July-Aug. | T,RH,P,W,C |
| 2 | Coram Ranger Station | 1934-57 | May-Oct. | T,RH,P,W,C |
| 3 | Abbott Basin South | 1958-64 | May-Oct. | T,RH,P |
| 4 | Abbott Basin North | 1958-60 | May-Oct. | T,RH,P |
| 5 | Wartime Cuttings | 1961-64 | May-Oct. | T,RH,P |
| 6 | Spacing Study | 1968-82 | May-Oct. | T,RH,P |
| 7 | 60-Acre Clearcut | 1971-80 | May-Oct. | T,RH,P |
| 8 | 30-Acre Clearcut | 1981 | May-Oct. | T,RH,P |
| 9 | Abbott Creek | 1974-77 | Jan.-Dec. | T,RH,S |
| 10 | Group Selection | 1975-81 | Jan.-Dec. | T,RH,P,S,NR,W,E,HF,ST |
| 11 | Uncut | 1974-78 | Jan.-Dec. | T,RH,P,S,NR,W,E,HF,ST |
| 12 | Shelterwood | 1975-81 | Jan.-Dec. | T,RH,P,S,NR,W,E,HF,ST |
| 13 | Clearcut | 1974-81 | Jan.-Dec. | T,RH,P,S,NR,W,E,HF,ST |
| 14 | Abbott Creek Snow Gage | 1974-78 | Jan.-Dec. | P |
| 15 | Clearcut Soil Temperature | 1975-81 | Jan.-Dec. | ST |
| 16 | Uncut Block 24 | 1975-77 | Jan.-Dec. | ST |
| 17 | Clearcut Block 13 | 1978-81 | Jan.-Dec. | ST |
| 18 | Flume | 1975-82 | Jan.-Dec. | $H_2O$,WT |

T = air temperature
RH = relative humidity
P = precipitation
W = wind
C = clouds
S = solar irradiance
NR = net irradiance
E = evaporation
HF = soil heat flux
ST = soil temperature
$H_2O$ = water flow
WT = water temperature

measurements were made with mechanical pyranographs and LICOR pyranometers. Net irradiance was measured using Funk-type radiometers attached to 30-day chart recorders or the data acquisition system.

Wind run and azimuth (stations 10–13) were measured with a cup anemometer and vane at 10 feet (3 m) above the ground attached to 30-day chart recorders. Wind was measured at 20 feet (6 m) at Coram Ranger Station, Desert Mountain, Hungry Horse Dam, and West Glacier. Soil temperature was measured with mercury sensors attached to 30-day charts or thermistors wired to the data acquisition system. Heat flux was measured using a double-sided thermopile unit attached to a 30-day chart recorder.

We have not included relative humidity summaries in this report because of difficulties calibrating hygrothermographs among climatic stations on the Forest. Data are not consistent enough to provide reliable summaries.

# INDIVIDUAL WEATHER STATION HISTORIES

## Desert Mountain Lookout

This station (1, fig. 1) was in operation from 1936 to 1973, with air temperature and relative humidity data being recorded from the time the lookout was manned, generally in June, to sometime in September when it was closed for the year. As a result, we were able to obtain complete monthly data only for July and August (appendix table 16).[1] Long-term averages cover the entire 38-year period. The station was located approximately 300 feet (91 m) south of the lookout on the crest of the ridge at an elevation of 6,370 feet (1 941 m). The area surrounding the station was open, with the nearest trees 100 feet (30 m) away. Habitat type is *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase.

## Coram Ranger Station

This station (2, fig. 1) measured humidity and precipitation, beginning in 1926, and was maintained through 1957 when the Ranger Station was moved to its current location in Hungry Horse. Air temperature readings were started in 1934. In this report, monthly summaries and long-term averages of temperature and precipitation cover the 24-year period from 1934 to 1957 (appendix tables 14 and 15). This station was usually operated between late April and October. It was located in the open at the Ranger Station headquarters at an elevation of 3,200 feet (975 m). Habitat type for surrounding forested areas is *Abies lasiocarpa/Clintonia uniflora-Aralia nudicaulis* phase.

## Abbott Basin South

This station (3, fig. 1) was established in 1958 in a 2-year-old 125-acre (50.5-ha) seed tree cutting and maintained from late April to early November each year through 1964. The station was located at the toe of a steep south-facing slope (70 percent) on a 20-percent slope. Elevation was approximately 4,250 feet (1 295 m). Air temperature and precipitation were measured and are included in this report (appendix table 11). Relative humidity was recorded, but is not presented. Habitat type at this location is *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase.

Figure 2.—Abbott Basin north station in clearcut as it appeared in 1958.

Figure 3.—Spacing study station in thinned larch stand as it appeared in 1972.

## Abbott Basin North

This station (4, fig. 1) was established in 1958 in a 2-year-old 125-acre (50.5-ha) seed tree cutting and maintained from late April to early November each year through 1960. The station was located (fig. 2) at the toe of a steep north-facing slope (60 percent) on a 10-percent slope. Elevation was approximately 4,250 feet (1 295 m). Air temperature, relative humidity, and precipitation were measured, but only air temperature and precipitation are summarized here (appendix table 11). Habitat type at this location is *Abies lasiocarpa/Clintonia uniflora-Clintonia uniflora* phase.

[1]Data summaries were obtained from Arnold Finklin, meteorologist at the Northern Forest Fire Lab, Missoula, Mont.

## Wartime Cuttings

This station (5, fig. 1) was started in 1961 and used through 1964, being maintained from May through October each year. It was located within a 1,300-acre (526-ha) seed tree cutting completed during World War II. The five seed trees per acre (12 per ha) were removed by 1960. Slope is 5 to 10 percent, with a western aspect on a small ridge at 3,500 feet (1 067 m). Air temperature, relative humidity, and precipitation measurements were taken. Air temperature and precipitation are presented in this report (appendix table 12). Habitat type at this location is *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase.

## Spacing Study

This station (6, fig. 1) was established in 1968 in a 15-year-old thinned larch stand that had an average tree height of 15 feet (4.6 m). Trees were thinned to a 7- by 7-foot (2.1- by 2.1-m) spacing and have been maintained at that spacing. The instruments have been maintained from late April to October each year through the present. The site (fig. 3) is a northwest-facing 20-percent slope at an elevation of 3,900 feet (1 189 m). In 1977, the instruments were moved about 60 feet (18 m) west to a more typical opening. Topographic features for the new location are the same. Air temperature and precipitation are summarized in this report (appendix tables 9 and 10). Relative humidity was recorded but is not presented. Habitat type for this site is *Abies lasiocarpa/Clintonia uniflora-Aralia nudicaulis* phase.

## 60-Acre Clearcut

This station (7, fig. 1) was established in 1971 and used through 1980, but data for 1979 are not complete. The station was generally maintained from late April through October. The location was in a 60-acre (24-ha) clearcut within a regenerated 18-year-old larch stand which had been thinned to a 12- by 12-foot (3.7- by 3.7-m) spacing at the time of instrumentation. Instruments were located in a broad draw bottom on a north-facing 20-percent slope at 4,150 feet (1 265 m) elevation. Air temperature is given in this report (appendix table 13). Relative humidity and precipitation data were recorded but are not presented. Habitat type for this site is *Abies lasiocarpa/Clintonia uniflora-Aralia nudicaulis* phase.

## 30-Acre Clearcut

This station (8, fig. 1) was established in 1981 and used only 1 year. The location was a north-facing 20-percent slope in a 28-year-old thinned larch stand at 3,900 feet (1 189 m) elevation. The stand was thinned to a 13- by 13-foot (4.0- by 4.0-m) spacing in 1961. Air temperature, relative humidity, and precipitation measurements were collected from May through October. Only air temperature is summarized here (appendix table 13). Habitat type for this site is *Abies lasiocarpa/Clintonia uniflora-Aralia nudicaulis* phase.

Figure 4.—Abbott Creek station in old clearcut as it appeared in 1974. Abbott Basin south and north stations were located in the background.

## Abbott Creek

This station (9, fig. 1) was established in 1974 in a 16-year-old 125-acre (50.5-ha) group seed tree cutting unit and maintained 12 months of the year until mid-1977. Instruments were located (fig. 4) on a 5-percent west-facing slope at 3,950 feet (1 204 m) elevation on a bench about 20 feet (6 m) above the creek. The area surrounding the station was open, with shrubs 4 to 5 feet (1.2 to 1.5 m) tall and young birch 10 to 15 feet (3.0 to 4.6 m) tall. Air temperature and solar irradiance data are summarized in this report (appendix tables 3-7, 19-20). Relative humidity was recorded but not presented. Habitat type at this location is *Abies lasiocarpa/Clintonia uniflora-Clintonia uniflora* phase.

## Group Selection

This station (10, fig. 1) was established in 1975 and maintained 12 months of the year through the present, with some lapses due to instrument failures. The site was harvested in 1974 and consists of 2-acre (0.8-ha) cutting units, which appear to be larger because trees between units were killed during burning. Instruments are located (fig. 5) on an east-facing 50-percent slope at an elevation of 4,250 feet (1 295 m) in the middle of a cutting unit 300 vertical feet (91 m) above Abbott Creek. Habitat type at this station is *Abies lasiocarpa/Clintonia uniflora-Clintonia uniflora* phase. In addition to the usual measurements (air temperature, relative humidity, and precipitation), soil heat flux, wind run and azimuth (at 10 feet [3 m]), solar and net irradiance, evaporation, and soil temperature (1-, 10-, 20-inch [2.5-, 25.4-, 50.8-cm] depths) were recorded. Chart-type recorders were replaced in 1978 by a data acquisition system that records soil and air temperature at hourly intervals and gives integrated readings of precipitation and solar irradiance. Data for soil heat flux, humidity, and evaporation are not presented here. All other summaries are given (appendix tables 3-8, 19-21, 25-29).

Figure 5.—Group selection station as it appeared in 1975 before broadcast burning. Abbott Basin is visible below.

Figure 6.—Uncut station as it appeared in 1975.

## Uncut

This station (11, fig. 1) was established in 1973 and maintained year-round through July 1978. The station was moved (fig. 6) about 660 feet (201 m) in 1974 because cutting on the group selection units altered the site too much. Both sites were located in mature timber stands on 60-percent slopes at an elevation of 4,450 feet (1 356 m), 400 vertical feet (122 m) above Abbott Creek. The first site faced southeast; the second faced east. Data represent conditions under the canopy in an *Abies lasiocarpa/Clintonia uniflora-Clintonia uniflora* habitat type. Solar and net irradiance, soil heat flux, wind run and azimuth, evaporation, and soil temperature (1-, 10-, 20-inch [2.5-, 25.4-, 50.8-cm] depths) were measured, in addition to air temperature, relative humidity, and precipitation. Chart-type recorders were used to collect all data at this station. Data for all except soil heat flux, relative humidity, and evaporation are summarized in this report (appendix tables 3-8, 19-21, 25-29).

Figure 7.—Clearcut station as it appeared in 1975 before broadcast burning.

## Shelterwood

This station (12, fig. 1) was established in 1975 and maintained 12 months of the year through the present, with some lapses due to equipment failure. The site was harvested in 1974 with 50 percent of the stand volume removed. Residue and remaining understory were burned in 1975 where our station is located. Residual stocking is 65 per acre (161 per ha), with mature larch, 100 to 120 feet (30 to 37 m) tall, near the station. Instruments were located on a 50-percent east-facing slope at 4,900 feet (1 494 m), 800 verticle feet (244 m) above Abbott Creek. Habitat type at this station is *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase. In addition to air temperature, relative humidity, and precipitation, the following factors were measured: solar and net irradiance, soil heat flux, wind run and azimuth, evaporation, and soil temperature (1-, 10-, 20-inch [2.5-, 25.4-, 50.8-cm] depths). Chart-type instruments were removed in 1978, with air and soil temperature being added to a data acquisition system. Data for all but soil heat flux, relative humidity, and evaporation are given here (appendix tables 3-8, 19-21, 25-29).

## Clearcut

This station (13, fig. 1) was started in the fall of 1973 before harvesting and has been maintained year-round through the present. Data from October 1973 through July 1974 represent the preharvest condition of a mature stand. Seventeen acres (6.9 ha) were clearcut in October 1974 and a portion was broadcast burned in 1975 where our station is located. Instruments were placed near the center of the clearcut (fig. 7) on an 80-percent east-facing aspect at an elevation of 5,200 feet (1 585 m), 600 vertical feet (183 m) above Abbott Creek. Habitat type at the station is *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase. In addition to the usual measurements (air temperature, relative humidity, and precipitation), soil heat flux, wind run and azimuth, solar and net irradiance, evaporation, and soil temperature (1-. 10-, 20-inch [2.5-, 25.4-, 50.8cm] depths) data

were collected. Chart-type instruments were removed in 1978 and replaced with a data acquisition system recording air and soil temperature at hourly intervals and providing integrated readings of precipitation and solar irradiance. All but soil heat flux, relative humidity, and evaporation are summarized in this report (appendix tables 3-8, 19-21, 25-29).

## Abbott Creek Snow Gage

This site (14, fig. 1), established in January 1974, was equipped with a propane-heated snow gage. This gage was maintained 12 months of the year through 1978 for measuring total precipitation. The site was about 660 feet (201 m) up the creek from the Abbott Creek station. The measuring device of the snow gage was a tipping bucket attached to a long-term chart recorder. These data are summarized along with other precipitation data (appendix table 8).

## Clearcut Soil Temperature

These sites (15, fig. 1) were set up in 1975 to measure soil and residue temperatures on conventionally logged and burned units, and on intensively utilized but unburned units within the clearcut. Microsite temperatures for litter surface, decayed wood, duff-soil interface, as well as the top, center, and under surfaces of residue, were measured periodically through 1977. In 1978, temperatures for litter surface and decayed wood were added to the continuous data acquisition system and have been recorded hourly through the present time. Sensors (thermistors) for both sites within the clearcut were on 60-percent east-facing slopes at 5,250 feet (1 600 m). Habitat type is *Abies lasiocarpa/Clintonia uniflora-Xerophyllum tenax* phase. Litter surface temperatures are summarized in this report (appendix tables 22-24).

## Uncut Block 24

This site (16, fig. 1) was established in an uncut unit in 1975 to serve as a control in the study of soil temperatures in clearcuts. Microsites were similar to site 15, but the habitat type is *Abies lasiocarpa/Clintonia uniflora-Menziesia ferruginea* phase. Data from this site were not added to the continuous data acquisition system, so this site was not used after June 1977. Sensors were located on a 30-percent east-facing slope at 5,400 feet (1 646 m). Litter surface temperatures are presented (appendix tables 22-24).

## Clearcut Block 13

This site (17, fig. 1) was established in 1978 when the continuous data acquisition system was installed. Litter surface temperature and decayed wood temperatures were recorded hourly through the present time for a burned, conventially utilized unit and an unburned, intensively utilized unit within the 13.6-acre (5.5-ha) clearcut logged in 1974. Both sites are on northeast-facing, 50-percent slopes at 4,250 feet (1 295 m) elevation. Thermistors are used as temperature sensors. Habitat type for the unburned unit is *Abies lasiocarpa/Clintonia uniflora-Aralia nudicaulis* phase, while the burned unit is *Tsuga heterophylla/Clintonia uniflora-Aralia nudicaulis* phase. Litter surface temperatures for this unit are presented (appendix tables 22-24).

## Flume

This site (18, fig. 1) was established in 1975 to monitor streamflow and water temperature on Abbott Creek. An H-flume with a stilling well and a chart recorder measures water level and temperature. Records are maintained currently but are not summarized in this report. Location is such that runoff from all utilization study cutting units empties into Abbott Creek above this flume. Habitat type for this site is *Tsuga heterophylla/Clintonia uniflora-Aralia nudicaulis* phase.

# OBSERVATIONS OF CLIMATE AND TOPOGRAPHIC INFLUENCES

## Air Temperature

Mean annual air temperatures for the Coram Experimental Forest and adjacent locations range from 36° to 45° F (2° to 8° C) (appendix tables 2-3). Long-term average for Hungry Horse Dam is 43.0° F (6.1° C) as compared to 41.8° F (5.4° C) for West Glacier (table 2). The lowest mean annual temperatures (36° to 39° F [2° to 4° C]) were recorded at Abbott Creek for the years 1974-77 (appendix table 3) and are probably representative of other nearby drainages. Stations such as the uncut site and group selection site, with means of 40° to 45° F (4° to 7° C), are probably representative of many slopes on the Forest.

Mean summer temperatures range from 55° to 62° F (13° to 17° C) (table 2 and appendix table 3), with long-term summer averages of 60.9° F (16.0° C) for Hungry Horse Dam and 58.6° F (14.8° C) for West Glacier. Mean summer temperatures decrease with elevation and changes in exposure toward the north. Southerly aspects would likely have means of 63° to 66° F (17° to 19° C). Recent measurements (data on file at Forestry Sciences Lab, Missoula) on other sites comparing north slopes with south slopes indicate daytime summer temperatures are 3° to 7° F (2° to 4° C) warmer on some south aspects.

Maximum air temperature on the Forest may exceed 100° F (38° C) at lower elevations, but rarely at the upper elevations. Maximums for any given year on the Abbott Basin sites (appendix table 6) quite often do not exceed 90° F (32° C) within a summer. Winters are cold (appendix table 7) and most winters have short periods of subzero temperatures. These typically last only a few days at a time.

During the growing season, maximum temperatures are generally higher at lower elevations but minimum temperatures are higher on the slopes. Average temperatures along the elevation gradient on the slopes follow the expected pattern, decreasing with an increase in elevation from the valley floor. Mean monthly maximum temperatures follow this trend also (fig. 8), but the situation is reversed for mean minimum temperatures (fig. 9). Differences for maximum temperatures between

the clearcut and the valley floor at Hungry Horse Dam are 5° to 10° F (3° to 6° C) from April through September (fig. 8). The clearcut at 1,840 feet (561 m) above Hungry Horse Dam is the highest elevational slope site. Maximum temperatures for other slope sites in between decreased with elevation. Even the local drainage bottom station (Abbott Creek) fits this pattern. Comparisons of long-term monthly average maximums revealed the same pattern, with Coram Ranger Station having the highest average maximum and Desert Mountain Lookout the lowest.

Minimum temperatures at Abbott Creek were coldest and the higher slope positions were warmest by 5° to 10° F (3° to 6° C) (fig. 9), especially from August through December. Hungry Horse Dam was not as cold as Abbott Creek. The same basic pattern occurs for the long-term average minimum temperatures, with Coram Ranger Station being coldest and Desert Mountain Lookout minimums as warm as Hungry Horse Dam and warmer than West Glacier.

## Frost-Free Days.

The frost-free period (number of days between occurrences of 32° F [0° C]) for the clearcut on the slope is 89 days longer than for nearby Abbott Creek, and 60 days longer than at West Glacier (fig. 10). These data are for the year 1976, but data are similar in other years. Abbott Creek has the shortest frost-free season of any station we have data for on or near the Forest. This site is probably representative of other drainages on the Forest. There is apparently little difference (15 to 18 days, fig. 10) for sites with different positions on the same slope. Silvicultural treatment appeared to have little influence. Differences of 60 to 89 days in length of frost-free season may significantly affect biological systems and plant growth. These differences also illustrate the difficulty of extrapolating weather data from valley bottoms to nearby mountain slopes, especially during the spring and fall.

## Precipitation

Annual precipitation averages 34 inches (86 cm) at Hungry Horse Dam and 30 inches (76 cm) at West Glacier (table 2). These averages are typical of lower elevations of the Forest. Snow survey data suggest 40 inches (102 cm) of precipitation at Desert Mountain Lookout and other ridges within the Forest. Increased precipitation is received in the form of snow in the winter months (November-March). Precipitation for Abbott Creek (appendix table 8) should be higher than recorded. The heated snow gage caused evaporation and thus artificially low readings. We estimate that amounts for November, December, January, February, and March should be 2 to 2.5 times greater than shown.

During the growing season precipitation seems to fall uniformly on the Forest (appendix tables 8, 10, 17-18). Amounts for Abbott Basin stations (appendix table 8) and amounts at Hungry Horse Dam for the same years

**Table 2.**—Long-term averages of air temperature and precipitation

| Station[1] | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Mean Monthly Air Temperature (°F) | | | | | | | |
| Hungry Horse Dam[2] | 22 | 28 | 32 | 41 | 51 | 58 | 65 | 64 | 54 | 43 | 32 | 26 | 43 |
| Coram RS[3] | | | | | | 56 | 63 | 61 | 54 | | | | |
| Desert Mt. LO[4] | | | | | | | 59 | 59 | | | | | |
| West Glacier[5] | 21 | 27 | 31 | 41 | 50 | 57 | 63 | 62 | 53 | 42 | 31 | 25 | 42 |
| | | | | | | Mean Monthly Maximum Air Temperature (°F) | | | | | | | |
| Hungry Horse Dam | 28 | 35 | 41 | 51 | 63 | 71 | 80 | 78 | 66 | 53 | 38 | 32 | 53 |
| Coram RS | | | | | | 71 | 83 | 82 | 72 | | | | |
| Desert Mt. LO | | | | | | | 70 | 69 | | | | | |
| West Glacier | 28 | 35 | 41 | 52 | 64 | 71 | 80 | 78 | 66 | 53 | 37 | 31 | 53 |
| | | | | | | Mean Monthly Minimum Air Temperature (°F) | | | | | | | |
| Hungry Horse Dam | 15 | 20 | 22 | 31 | 39 | 46 | 50 | 49 | 41 | 33 | 26 | 20 | 33 |
| Coram RS | | | | | | 41 | 43 | 41 | 36 | | | | |
| Desert Mt. LO | | | | | | | 49 | 49 | | | | | |
| West Glacier | 14 | 19 | 22 | 29 | 36 | 43 | 47 | 46 | 39 | 32 | 24 | 19 | 31 |
| | | | | | | Precipitation Averages (inches) | | | | | | | |
| Hungry Horse Dam[2] | 3.83 | 2.66 | 2.20 | 2.13 | 2.74 | 3.19 | 1.61 | 2.20 | 2.56 | 3.00 | 3.56 | 3.82 | 33.50 |
| Coram RS[3] | | | | | | 2.66 | 1.36 | 1.39 | 1.54 | | | | |
| Desert Mt. LO[4] | | | | | | | 1.25 | 1.36 | | | | | |
| West Glacier[5] | 3.61 | 2.61 | 1.78 | 1.79 | 2.57 | 3.24 | 1.61 | 1.87 | 2.14 | 2.18 | 2.98 | 3.54 | 29.92 |

[1]RS = Ranger Station; LO = Lookout.
[2]1951-80. Averages based on readings for 24-h period taken at 8 a.m. 1951-53; 8 p.m. 1953-66; 9 a.m. 1967-80.
[3]1934-57. Averages based on readings for 24-h period taken at 5:30 p.m. 1935-45; 5 p.m. 1946-48; 4 p.m. 1949-57.
[4]1936-73. Averages based on readings for 24-h period taken at 5 p.m. prior to 1950 and 4 p.m. after 1950.
[5]1951-80. Averages based on readings for 24-h period taken at 5 p.m.

(appendix table 17) are quite similar. Precipitation patterns may differ by storm or for individual months; however, precipitation differences balance out over a season or over several years. Long-term averages (table 2) for Desert Mountain Lookout in July and August are less than for Hungry Horse Dam and West Glacier. Some of this difference may be attributed to using different periods for calculating the averages. Further, the amounts at Desert Mountain were incomplete in many years (footnotes, appendix table 16). Another influence is the greater exposure to wind, which affects gage catch (Hayes 1944). A stricter comparison, using only those days with measurements at both stations during July and August 1941-70, actually shows about 10 percent more precipitation at Desert Mountain than at West

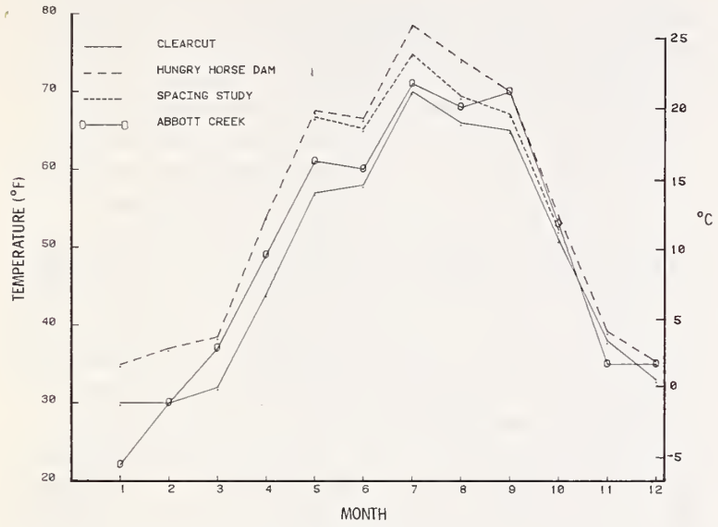


Figure 8.—Mean maximum monthly air temperatures for valley bottom station (Hungry Horse Dam), mid-slope stations (clearcut and spacing study), and local mountain drainage (Abbott Creek) for 1976.

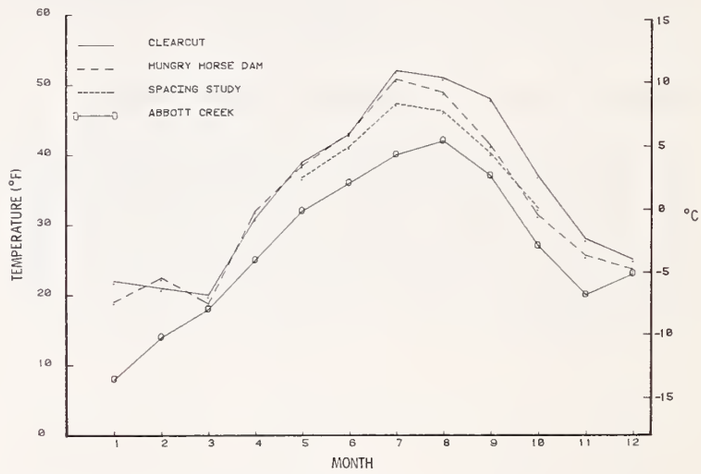


Figure 9.—Mean minimum monthly air temperatures for valley bottom station (Hungry Horse Dam), mid-slope stations (clearcut and spacing study), and local mountain drainage (Abbott Creek) for 1976.

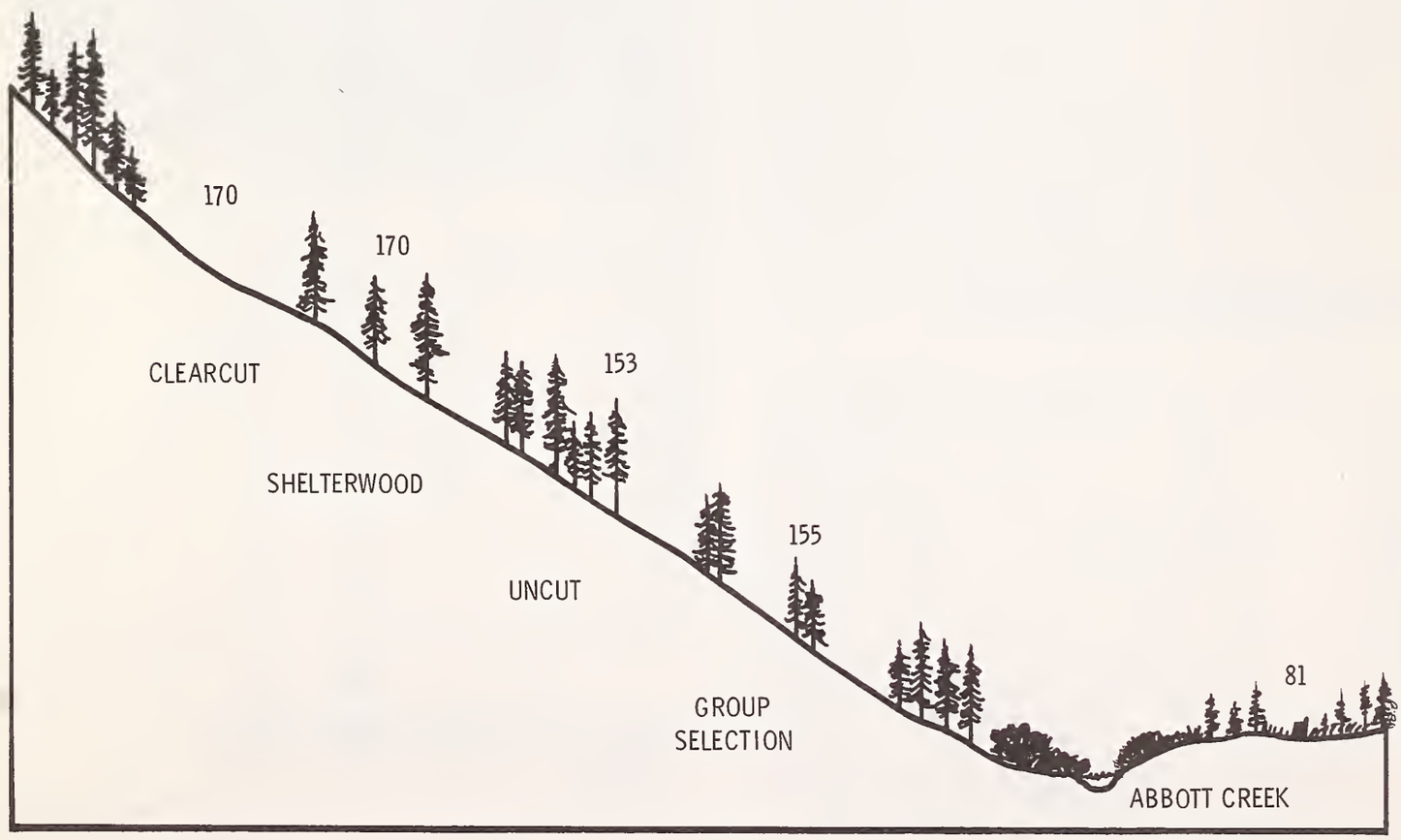


Figure 10.—Frost-free days for stations in 1976 from Abbott Creek and the slope above. West Glacier had 110 frost-free days for the same period. Frost-free days are based on number of days between occurrences of 32° F (0° C).

Glacier. These data were analyzed by Arnold Finklin, Northern Forest Fire Lab, Missoula, Mont.

The period from 1973 through 1981, for which the most intensive data collection occurred, was slightly wetter (0.5 inch [1.27 cm]) than the 30-year normal. Five years were wetter, with 1980 having 6.8 inches (17.3 cm) more than normal and 5.6 inches (14.2 cm) of this increase were received from May through September. Four years were drier, with 1979 having 6.4 inches (16.3 cm) less than normal and 5.4 inches (13.7 cm) of this deficit occurred from June through September.

## Microsite and Treatment Differences

Shortwave solar irradiance was similar for all sites in the open. Small differences were caused by slope position and horizon shading by nearby ridges (appendix tables 19-20). The amount received on the uncut unit is 25 percent of that received at the clearcut unit (fig. 11)—a difference that is important to understory vegetation and tree regeneration.

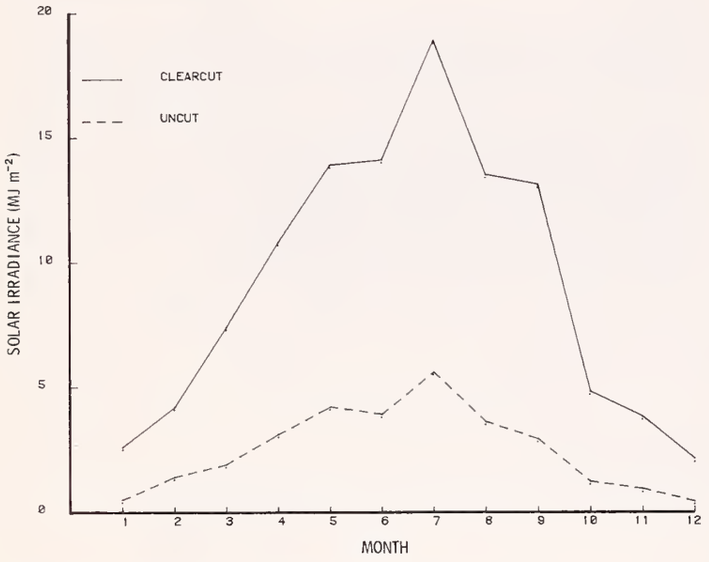


Figure 11.—Mean solar irradiance for uncut and clearcut stands on a 55-percent east-facing slope for 1975.

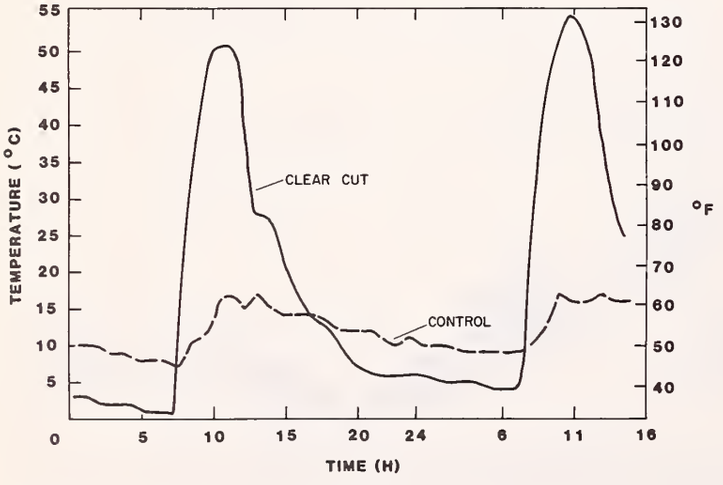


Figure 12.—Diurnal litter surface temperatures for uncut and clearcut stands on a 55-percent east-facing slope.

Differences in irradiance translate into large differences in litter surface temperatures. A typical diurnal comparison (fig. 12) for the clearcut and uncut units shows that maximum temperatures on the clearcut surface approach lethal temperatures of 122° to 131° F (50° to 55° C) for plant tissue (Levitt 1980). Minimum temperatures are also lower on the clearcut. These values are fairly typical of conditions that can occur on slopes in the Forest (appendix tables 22-24). Because these values are from east-facing aspects, we would expect conditions to be more severe on south- and west-facing aspects and less severe on north aspects. Other observations (Hungerford 1980) indicate that surface condition, such as litter residues, vegetation, or mineral soil, can significantly affect surface temperatures.

A typical annual trace of soil temperature by depth in a clearcut that is partially vegetated shows the changes with season and the lag of the maximum by depth (fig. 13). Other locations (appendix tables 25-27) show similar trends and values, except that summer soil temperatures in the uncut unit are typically lower than in the cut unit. Mean annual soil temperatures for the upper Abbott Basin sites for the 1974-78 period at the 20-inch (50.8-cm) depth average 39° to 43° F (4° to 6° C) (appendix table 27). Mean summer temperature at the 20-inch (50.8-cm) depth averaged 50° to 53° F (10° to 12° C).

Wind data for all cutting treatments in Abbott Basin showed the diurnal shift in wind direction during the summer months (appendix table 29). As should be expected, winds were upslope (from the southeast and east) during the day and downslope (from the south and southwest) at night. This pattern has significant implications for seed fall and distribution (Shearer 1980). Wind data, at 10 feet (3 m) (appendix table 28), also suggest that windspeeds are greater in the clearcut than the other units and that surface speeds are greater in all cutting units than in the uncut.

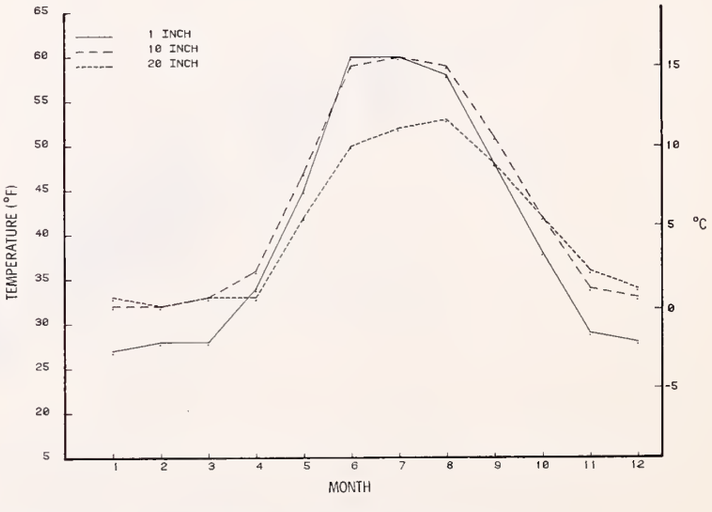


Figure 13.—Mean soil temperatures (°F) at depths of 1, 10, and 20 inches in a clearcut for 1977.

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A. Schlieter.
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 20 710 20   Intermountain Forest and Range Experiment Station (Ogden, Utah)
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# APPENDIX

## Weather Summary Tables

**Table 3.**—Mean monthly air temperature for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | | |
| 1975 | | | | | 45 | 51 | 70 | 59 | 53 | 40 | 29 | 27 | 41* |
| 1976 | 27 | 28 | 30 | 38 | 47 | 49 | 59 | 59 | 58 | 46 | 36 | 32 | 43 |
| 1977 | 26 | 36 | 35 | 47 | 48 | 63 | 64 | 63 | 53 | 44 | 30 | 24 | 45 |
| 1978 | 21 | 26 | 34 | 36 | 44 | 57 | 63 | 58 | 54* | 44* | 28 | 21 | 41 |
| 1979 | 12 | 26 | 35* | | 48* | 54* | | | 61* | 47 | 30 | 32 | 43* |
| 1980 | 19 | 30 | 31 | 46 | 50* | 56 | 60* | | | 45* | 34 | 31 | 43* |
| 1981 | 29 | 29 | 36 | | 48 | 50* | 63* | | | | | | 43* |
| Uncut | | | | | | | | | | | | | |
| 1973 | | | | | | | | 68 | 55 | 46 | 29 | 30 | 44* |
| 1974 | 19 | 30 | 30 | 40 | 44 | 61 | 65 | 61 | 54 | 47 | 33 | 29 | 43 |
| 1975 | 23 | 23 | 27 | 37 | 45 | 51 | 66 | 56 | 51 | 39 | 29 | 26 | 40 |
| 1976 | 26 | 26 | 27 | 38 | 48 | 49 | 59 | 55 | 53 | 44 | 32 | 27 | 41 |
| 1977 | 18 | 30 | 29 | 42 | 44 | 64 | 65 | 64 | 53 | 41 | 31 | 17 | 44 |
| 1978 | 22 | 28 | 35 | 39 | 44 | 56 | 59 | | | | | | 42* |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | 55 | 48 | 45 | 33 | 29 | 41* |
| 1975 | 26 | 25 | 29 | 38 | 44 | 47 | 63 | 51 | 50 | 39 | 31 | 26 | 41 |
| 1976 | 29 | 27 | 27 | 38 | 48 | 50 | 61 | 57 | 57 | 43 | 35 | 29 | 42 |
| 1977 | 22 | 31 | 30 | 41 | 43 | 60 | 62 | | | | | | 42* |
| 1978 | | | | | | 55 | 61 | 56 | 51 | 40 | 22 | 15 | 41* |
| 1979 | 7 | 22 | 30* | | | 52 | | | 57* | 43 | 25 | 27 | 38* |
| 1980 | 12 | 26 | 25 | 42 | 47* | 53 | 56* | | | 42 | 29 | 26 | 39* |
| 1981 | 26 | 24 | 32 | | 45 | 47 | 57* | | | 37 | 33 | 22 | 39* |
| Clearcut | | | | | | | | | | [1] | | | |
| 1973 | | | | | | | | | | 39 | 24 | 25 | |
| 1974 | 14 | 26 | 26 | 35 | 40 | 56 | 57 | | | 47 | 31 | 27 | 36 |
| 1975 | 20 | 19 | 24 | 31 | 43 | 50 | 65 | 55 | 51 | 39 | 28 | 26 | 38 |
| 1976 | 26 | 25 | 25 | 37 | 48 | 50 | 61 | 58 | 56 | 43 | 32 | 28 | 41 |
| 1977 | 20 | 33 | 30 | 43 | 45 | 59 | 62 | 61 | 51 | 42 | 26 | 21 | 42 |
| 1978 | 21 | 26 | 34 | 37 | 42 | 54 | 58 | 55 | 52 | 40 | 22 | 15 | 38 |
| 1979 | 8 | 22 | 32* | | 45 | 53 | | | 60* | 49 | 34 | 34 | 41* |
| 1980 | 24 | 30 | 28 | 42 | 46* | 51 | 54* | | | 41 | 29 | 26 | 40* |
| 1981 | 26 | 24 | 32 | | 44 | 45 | 56* | | | 36 | 32 | 21 | 39* |
| Abbott Creek | | | | | | | | | | | | | |
| 1974 | 17 | 23 | 24 | 33 | 42 | 59 | 60 | 57 | 47 | 39 | 32 | 27 | 39 |
| 1975 | 21 | 19 | 25 | 32 | 42 | 47 | 63 | 51 | 44 | 35 | 22 | 12 | 36 |
| 1976 | 15 | 21 | 27 | 36 | 46 | 48 | 54 | 53 | 51 | 38 | 27 | 29 | 37 |
| 1977 | 18 | 27 | 29 | 39 | 43 | 64 | 65 | | | | | | 41* |

*Estimated means from partial records.
[1]Period before cutting.

**Table 4.**—Mean monthly maximum air temperature for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | | |
| 1975 | | | | | 55 | 62 | 83 | 70 | 66 | 46 | 34 | 31 | 49* |
| 1976 | 32 | 34 | 36 | 46 | 58 | 58 | 70 | 70 | 70 | 54 | 41 | 36 | 50 |
| 1977 | 29 | 41 | 41 | 58 | 56 | 74 | 75 | 73 | 63 | 53 | 35 | 29 | 53 |
| 1978 | 26 | 33 | 44 | 49 | 52 | 70 | 76 | 68 | 63 | 54 | 33 | 25 | 49 |
| 1979 | 18 | 32 | 42* | | | 65 | | | 74* | 55 | 35 | 37 | 51* |
| 1980 | 25 | 35 | 37 | 56 | 61* | 68 | 70* | | | 54* | 39 | 36 | 52* |
| 1981 | 32 | 35 | 46 | | 60* | 60* | 75* | | | 55* | | | |
| Uncut | | | | | | | | | | | | | |
| 1973 | | | | | | | | 82 | 64 | 52 | 32 | 34 | 52* |
| 1974 | 24 | 34 | 36 | 46 | 51 | 72 | 74 | 70 | 64 | 55 | 37 | 31 | 50 |
| 1975 | 26 | 28 | 31 | 41 | 53 | 59 | 76 | 64 | 61 | 44 | 32 | 30 | 47 |
| 1976 | 30 | 31 | 33 | 45 | 58 | 57 | 69 | 63 | 62 | 51 | 36 | 31 | 48 |
| 1977 | 23 | 35 | 34 | 49 | 50 | 74 | 74 | 72 | 59 | 48 | 35 | 20 | 50 |
| 1978 | 25 | 33 | 41 | 45 | 50 | 65 | 69 | | | | | | 49* |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | 64 | 55 | 51 | 36 | 31 | 47* |
| 1975 | 29 | 30 | 33 | 43 | 51 | 55 | 73 | 59 | 58 | 44 | 35 | 30 | 46 |
| 1976 | 32 | 31 | 34 | 45 | 58 | 58 | 70 | 65 | 65 | 49 | 39 | 33 | 49 |
| 1977 | 26 | 36 | 35 | 50 | 51 | 69 | 69 | | | | | | 50* |
| 1978 | | | | | | 66 | 72 | 65 | 58* | 46 | 27 | 19 | 45* |
| 1979 | 12 | 27 | 36* | | | 62* | | | 67* | 49 | 28 | 32 | 46* |
| 1980 | 18 | 29 | 31 | 50 | 56* | 64 | 66* | | | 48 | 33 | 31 | 46* |
| 1981 | 30 | 29 | 40 | | 54 | 55 | 70* | | | 43 | 37 | 26 | 46* |
| Clearcut | | | | | | | | | | [1] | | | |
| 1973 | | | | | | | | | | 44 | 26 | 27 | |
| 1974 | 20 | 29 | 30 | 40 | 45 | 65 | 65 | | | 55 | 35 | 30 | 40 |
| 1975 | 25 | 26 | 30 | 37 | 50 | 58 | 75 | 63 | 60 | 44 | 32 | 30 | 44 |
| 1976 | 30 | 30 | 32 | 44 | 57 | 58 | 70 | 66 | 65 | 51 | 38 | 33 | 48 |
| 1977 | 25 | 38 | 35 | 51 | 53 | 68 | 70 | 69 | 58 | 49 | 31 | 26 | 49 |
| 1978 | 26 | 31 | 40 | 44 | 47 | 64 | 69 | 64 | 58 | 47 | 27 | 20 | 45 |
| 1979 | 14 | 27 | 38* | | | 61 | | | 70* | 54 | 37 | 38 | 45* |
| 1980 | 29 | 33 | 33 | 49 | 54* | 60 | 63* | | | 48 | 33 | 31 | 47* |
| 1981 | 30 | 29 | 39 | | 52 | 52 | 66* | | | 42 | 37 | 26 | 45* |
| Abbott Creek | | | | | | | | | | | | | |
| 1974 | 23 | 31 | 34 | 44 | 53 | 75 | 77 | 74 | 68 | 59 | 38 | 32 | 51 |
| 1975 | 28 | 28 | 34 | 44 | 55 | 61 | 81 | 65 | 65 | 45 | 28 | 19 | 48 |
| 1976 | 22 | 30 | 37 | 49 | 61 | 60 | 71 | 68 | 70 | 53 | 35 | 35 | 49 |
| 1977 | 24 | 37 | 38 | 56 | 56 | 80 | 80 | | | | | | 53* |

*Estimated from partial records.
[1]Period before cutting.

**Table 5.**—Mean monthly minimum air temperature for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | | |
| 1975 | | | | | 35 | 43 | 59 | 51 | 42 | 35 | 25 | 22 | 35* |
| 1976 | 22 | 23 | 22 | 31 | 37 | 41 | 49 | 51 | 49 | 39 | 32 | 29 | 35 |
| 1977 | 22 | 30 | 30 | 37 | 41 | 53 | 55 | 54 | 46 | 37 | 26 | 18 | 38 |
| 1978 | 20 | 24 | 31 | 35 | 38 | 46 | 51 | 49 | 48 | 36 | 23 | 17 | 35 |
| 1979 | 7 | 22 | 28* | | | 44 | | | 48* | 40 | 27 | 29 | 39* |
| 1980 | 13 | 27 | 26 | 36 | 40* | 47 | 51* | | | 33* | 30 | 24 | 35* |
| 1981 | 26 | 25 | 28 | | 41 | 44* | 51* | | | 45 | | | 36* |
| Uncut | | | | | | | | | | | | | |
| 1973 | | | | | | | | 57 | 47 | 41 | 26 | 27 | 40* |
| 1974 | 17 | 27 | 24 | 34 | 38 | 51 | 55 | 52 | 43 | 39 | 30 | 25 | 37 |
| 1975 | 18 | 18 | 23 | 32 | 39 | 43 | 57 | 49 | 43 | 35 | 25 | 22 | 34 |
| 1976 | 21 | 23 | 21 | 32 | 38 | 42 | 50 | 48 | 44 | 37 | 28 | 25 | 34 |
| 1977 | 14 | 25 | 25 | 34 | 37 | 54 | 57 | 56 | 47 | 36 | 28 | 12 | 38 |
| 1978 | 18 | 24 | 30 | 33 | 39 | 47 | 52 | | | | | | 35* |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | 48 | 39 | 38 | 30 | 25 | 36* |
| 1975 | 21 | 21 | 24 | 32 | 38 | 40 | 54 | 44 | 42 | 35 | 27 | 22 | 35 |
| 1976 | 24 | 23 | 22 | 32 | 39 | 43 | 53 | 52 | 50 | 38 | 31 | 26 | 36 |
| 1977 | 19 | 26 | 25 | 33 | 37 | 52 | 54 | | | | | | 35* |
| 1978 | | | | | | 45 | 52 | 48 | 45 | 33 | 17 | 10 | 34* |
| 1979 | 2 | 17 | 24* | | | 44 | | | 47* | 37 | 21 | 23 | 35* |
| 1980 | 5 | 22 | 20 | 34 | 38* | 44 | 49* | | | 36 | 26 | 21 | 32* |
| 1981 | 22 | 20 | 26 | | 38 | 40 | 47* | | | 32 | 30 | 18 | 33* |
| Clearcut | | | | | | | | | | [1] | | | |
| 1973 | | | | | | | | | | 36 | 21 | 23 | |
| 1974 | 14 | 23 | 22 | 31 | 35 | 48 | 50 | | | 41 | 27 | 24 | 31 |
| 1975 | 16 | 14 | 19 | 25 | 37 | 43 | 56 | 48 | 43 | 34 | 23 | 21 | 32 |
| 1976 | 22 | 21 | 20 | 31 | 39 | 43 | 52 | 51 | 48 | 37 | 28 | 25 | 35 |
| 1977 | 16 | 28 | 25 | 34 | 38 | 50 | 54 | 54 | 45 | 37 | 23 | 16 | 36 |
| 1978 | 17 | 20 | 28 | 31 | 37 | 45 | 50 | 47 | 47 | 34 | 17 | 11 | 32 |
| 1979 | 2 | 17 | 26* | | | 44 | | | 51* | 44 | 32 | 32 | 35* |
| 1980 | 20 | 27 | 23 | 35 | 37* | 43 | 47* | | | 35 | 25 | 21 | 34* |
| 1981 | 22 | 19 | 25 | | 38 | 38 | 45* | | | 31 | 29 | 17 | 33* |
| Abbott Creek | | | | | | | | | | | | | |
| 1974 | 12 | 17 | 16 | 25 | 32 | 43 | 45 | 43 | 32 | 26 | 26 | 23 | 29 |
| 1975 | 14 | 11 | 16 | 20 | 31 | 35 | 47 | 39 | 30 | 26 | 13 | 7 | 25 |
| 1976 | 8 | 14 | 18 | 25 | 32 | 36 | 40 | 42 | 37 | 27 | 20 | 23 | 27 |
| 1977 | 11 | 20 | 22 | 26 | 32 | 47 | 49 | | | | | | 29* |

*Estimated from partial records.
[1]Period before cutting.

**Table 6.**—Monthly maximum air temperature for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | |
| 1975 | | | | | 69 | 80 | 95 | 87 | 77 | 69 | 61 | 53 |
| 1976 | 48 | 46 | 60 | 64 | 75 | 82 | 81 | 85 | 83 | 78 | 52 | 50 |
| 1977 | 45 | 52 | 52 | 80 | 76 | 86 | 90 | 91 | 78 | 66 | 50 | 44 |
| 1978 | 41 | 51 | 57 | 63 | 68 | 82 | 88 | 88 | 81 | 70 | 57 | 37 |
| 1979 | 34 | 43 | 54 | | 77 | 81 | | | 84 | 77 | 43 | 46 |
| 1980 | 43 | 48 | 48 | 77 | 66 | 81 | 82 | | | | 54 | 55 |
| 1981 | 39 | 52 | 57 | | 73 | | 88 | | | 66 | | |
| Uncut | | | | | | | | | | | | |
| 1973 | | | | | | | | 91 | 86 | 67 | 45 | 41 |
| 1974 | 42 | 44 | 54 | 66 | 66 | 86 | 88 | 89 | 77 | 71 | 46 | 40 |
| 1975 | 40 | 40 | 40 | 50 | 70 | 73 | 89 | 79 | 73 | 64 | 60 | 49 |
| 1976 | 42 | 43 | 51 | 66 | 74 | 81 | 80 | 75 | 73 | 71 | 48 | 44 |
| 1977 | 37 | 45 | 47 | 73 | 69 | 85 | 90 | 88 | 76 | 59 | 47 | 29 |
| 1978 | 32 | 43 | 59 | 59 | 66 | 80 | 83 | | | | | |
| Shelterwood | | | | | | | | | | | | |
| 1974 | | | | | | | | 72 | 64 | 64 | 44 | 42 |
| 1975 | 40 | 39 | 47 | 52 | 71 | 69 | 84 | 77 | 70 | 64 | 58 | 48 |
| 1976 | 44 | 42 | 54 | 61 | 75 | 82 | 81 | 77 | 78 | 71 | 50 | 46 |
| 1977 | 41 | 48 | 48 | 76 | 70 | 80 | 76 | | | | | |
| 1978 | | | | | | 79 | 84 | 84 | 77 | 61 | 52 | 32 |
| 1979 | 32 | 41 | 46 | | 73 | 77 | | | 75 | 70 | 41 | 41 |
| 1980 | 36 | 43 | 41 | 72 | | 75 | 79 | | | 72 | 54 | 48 |
| 1981 | 45 | 46 | 50 | | 70 | 82 | 82 | | | 55 | 55 | 43 |
| Clearcut | | | | | | | | | | | | |
| 1973 | | | | | | | | | | 54 | 40 | 35 |
| 1974 | 37 | 35 | 43 | 58 | 57 | 80 | 78 | | | 65 | 44 | 40 |
| 1975 | 38 | 38 | 46 | 50 | 67 | 71 | 87 | 80 | 73 | 66 | 60 | 48 |
| 1976 | 44 | 42 | 52 | 59 | 73 | 80 | 80 | 80 | 77 | 72 | 53 | 46 |
| 1977 | 41 | 49 | 48 | 74 | 70 | 82 | 84 | 86 | 74 | 62 | 48 | 39 |
| 1978 | 37 | 44 | 59 | 56 | 65 | 77 | 80 | 81 | 75 | 63 | 52 | 32 |
| 1979 | 32 | 37 | 50 | | 72 | 73 | | | 77 | 70 | 46 | 45 |
| 1980 | 39 | 43 | 43 | 70 | | 73 | 77 | | | 70 | 54 | 48 |
| 1981 | 45 | 45 | 48 | | 64 | 75 | 77 | | | 52 | 55 | 41 |
| Abbott Creek | | | | | | | | | | | | |
| 1974 | 39 | 43 | 48 | 67 | 68 | 91 | 90 | 91 | 81 | 72 | 54 | 39 |
| 1975 | 42 | 41 | 48 | 58 | 77 | 81 | 91 | 77 | 78 | 68 | 61 | 38 |
| 1976 | 37 | 49 | 59 | 68 | 79 | 86 | 83 | 84 | 83 | 78 | 52 | 46 |
| 1977 | 41 | 51 | 52 | 79 | 79 | 94 | 94 | | | | | |

**Table 7.**—Monthly minimum air temperature for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | |
| 1975 | | | | | 27 | 34 | 49 | 42 | 34 | 27 | 3 | 9 |
| 1976 | 2 | -5 | -2 | 23 | 30 | 32 | 39 | 44 | 38 | 26 | 14 | 20 |
| 1977 | 8 | 22 | 21 | 28 | 31 | 42 | 46 | 48 | 40 | 29 | 2 | -4 |
| 1978 | -3 | 3 | 2 | 29 | 30 | 37 | 43 | 41 | 39 | 30 | 7 | -9 |
| 1979 | -9 | 5 | 19 | | | 32 | | | 39 | 28 | 16 | 3 |
| 1980 | -4 | 5 | 3 | 23 | | 37 | 46 | | | 28 | 12 | 7 |
| 1981 | 16 | -4 | 19 | | 34 | | 45 | | | | | |
| Uncut | | | | | | | | | | | | |
| 1973 | | | | | | | | 43 | 32 | 29 | 8 | 17 |
| 1974 | -5 | 19 | 11 | 27 | 31 | 39 | 46 | 40 | 33 | 28 | 22 | 16 |
| 1975 | -8 | -4 | 14 | 30 | 29 | 37 | 48 | 40 | 35 | 27 | 2 | 10 |
| 1976 | 1 | -4 | -10 | 26 | 31 | 33 | 44 | 39 | 33 | 25 | 8 | 9 |
| 1977 | -1 | 16 | 14 | 18 | 29 | 44 | 47 | 48 | 35 | 27 | 3 | 1 |
| 1978 | 3 | 2 | 0 | 28 | 30 | 39 | 44 | | | | | |
| Shelterwood | | | | | | | | | | | | |
| 1974 | | | | | | | | 40 | 27 | 20 | 19 | 12 |
| 1975 | -1 | 4 | 8 | 29 | 27 | 33 | 43 | 34 | 32 | 26 | 14 | 9 |
| 1976 | 8 | -2 | -4 | 23 | 33 | 33 | 43 | 42 | 38 | 24 | 16 | 15 |
| 1977 | 6 | 22 | 14 | 18 | 31 | 39 | 51 | | | | | |
| 1978 | | | | | | 37 | 41 | 39 | 34 | 25 | -2 | -18 |
| 1979 | -17 | -2 | 14 | | | 32 | | | 41 | 23 | 5 | -8 |
| 1980 | -15 | -6 | -4 | 18 | | 34 | 45 | | | 23 | 7 | 0 |
| 1981 | 9 | -18 | 14 | | 28 | 32 | 36 | | | 19 | 14 | 3 |
| Clearcut | | | | | | | | | | | | |
| 1973 | | | | | | | | | | 23 | 2 | 2 |
| 1974 | -8 | 17 | 7 | 23 | 28 | 35 | 40 | | | 30 | 17 | 11 |
| 1975 | -10 | -6 | 1 | 3 | 27 | 35 | 44 | 38 | 33 | 24 | 0 | 5 |
| 1976 | 2 | -7 | -11 | 22 | 33 | 34 | 42 | 41 | 35 | 22 | 11 | 8 |
| 1977 | 0 | 22 | 14 | 17 | 29 | 40 | 44 | 45 | 34 | 27 | -3 | -8 |
| 1978 | -5 | 1 | 0 | 25 | 27 | 35 | 41 | 37 | 37 | 25 | -2 | -17 |
| 1979 | -17 | -2 | 10 | | | 34 | | | 45 | 34 | 19 | 10 |
| 1980 | 3 | 10 | 9 | 21 | | 34 | 43 | | | 21 | 7 | 3 |
| 1981 | 12 | -18 | 14 | | 27 | 32 | 34 | | | 18 | 14 | 3 |
| Abbott Creek | | | | | | | | | | | | |
| 1974 | -14 | 3 | -5 | 16 | 21 | 29 | 37 | 31 | 23 | 17 | 16 | 1 |
| 1975 | -7 | -17 | -9 | -1 | 23 | 23 | 34 | 21 | 22 | 21 | -11 | -11 |
| 1976 | -13 | -20 | -17 | 19 | 25 | 28 | 34 | 34 | 27 | 10 | -10 | 1 |
| 1977 | -9 | 7 | 9 | 9 | 19 | 36 | 45 | | | | | |

**Table 8.**—Monthly precipitation for residue utilization study sites (inches)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group selection | | | | | | | | | | | | | |
| 1975 | | | | | | 2.43 | 1.99 | 3.78 | 1.52 | 3.97 | | | |
| 1976 | | | | | 2.27 | 2.96 | 2.44 | 3.20 | .95 | .46 | | | |
| 1977 | | | | | 1.75 | .53 | | | | | | | |
| 1978 | | | | | 1.89 | .75 | 1.46 | 4.00 | 1.90 | .40 | | | |
| 1979 | | | | | | 1.44 | .34 | | | 2.30 | | | |
| 1980 | | | | | | 4.70 | 1.08 | | | | | | |
| Uncut | | | | | | | | | | | | | |
| 1974 | | | | | 1.94 | 1.80 | 1.37 | 1.25 | 1.21 | 0.15 | | | |
| 1975 | | | | | 2.43 | 1.98 | 1.61 | 3.71 | 1.25 | 3.62 | | | |
| 1976 | | | | | 2.36 | 2.88 | 1.96 | 2.12 | .46 | .29 | | | |
| 1977 | | | | | 1.50 | .27 | 2.47 | 1.94 | 1.05 | | | | |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | | 1.26 | 0.17 | | | |
| 1975 | | | | | 1.67 | 2.83 | 1.96 | 4.64 | 1.41 | 3.60 | | | |
| 1976 | | | | | 2.39 | 3.13 | 2.54 | 3.35 | 1.05 | .52 | | | |
| 1977 | | | | | 1.38 | .81 | 3.71 | 2.96 | 3.72 | | | | |
| Clearcut | | | | | | | | | | | | | |
| 1974 | | | | | | 2.16 | 1.63 | | | | | | |
| 1975 | | | | | 1.58 | 3.37 | 2.11 | 4.62 | 1.69 | 3.99 | | | |
| 1976 | | | | | 1.51 | 3.54 | 3.00 | 3.93 | 1.33 | .71 | | | |
| 1977 | | | | | 2.67 | .87 | 3.49 | 2.52 | 3.36 | | | | |
| 1978 | | | | | 1.54 | .56 | 1.69 | 4.43 | 2.18 | .24 | | | |
| 1979 | | | | | | 1.47 | .44 | | | 2.40 | | | |
| 1980 | | | | | | 4.58 | 1.28 | | | | | | |
| Abbott Creek | | | | | | | | | | | | | |
| 1974 | 2.62 | 1.83 | 2.26 | 1.96 | 2.33 | 2.41 | 1.49 | 1.81 | 1.51 | 0.32 | 1.43 | 1.15 | 21.12 |
| 1975 | 2.25 | 2.03 | 1.48 | 1.45 | 2.21 | 3.04 | 1.95 | 4.34 | 1.59 | 4.44 | 2.24 | .93 | 27.95 |
| 1976 | 1.75 | 2.01 | .68 | 2.96 | 2.71 | 3.52 | 2.90 | 3.62 | 1.27 | .69 | 1.57 | .82 | 24.50 |
| 1977 | .72 | 1.57 | 2.82 | .89 | 2.59 | .75 | 3.40 | 2.93 | 3.59 | 1.22 | 2.14 | 3.85 | 26.47 |
| 1978 | 1.60 | .92 | 1.22 | 2.37 | 4.47 | .81 | 1.72 | 4.13* | 2.21* | .65* | .83* | 1.07* | 22.00* |

*Estimated using regression techniques.

Table 9.—Mean monthly, mean monthly maximum, and mean monthly minimum air temperature for spacing study site (°F)

| Year | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| | | | Mean Monthly Air Temperature | | | |
| 1968 | 50 | 59 | 63 | 59 | 51 | 40 |
| 1969 | 51 | 54 | 60 | 67 | 60 | 48 |
| 1970 | 50 | 59 | 63 | 62 | 46 | 38 |
| 1971 | 52 | 53 | 61 | 67 | 48 | 39 |
| 1972 | 54 | 61 | 62 | 67 | 51 | 43 |
| 1973 | 49 | 55 | 64 | 63 | 50 | 41 |
| 1974 | 44 | 59 | 61 | 51 | 46 | 38 |
| 1975 | | 48 | 61 | 57 | 51 | 41 |
| 1976 | 52 | 53 | 61 | 58 | 54 | 43 |
| 1977 | 45 | 62 | 64* | 63 | 53 | 46 |
| 1978 | 48 | 60 | 66 | 63 | 56 | 50* |
| 1979 | 58* | 61 | 68 | 69 | 61 | 56* |
| 1980 | 56 | 58 | 67* | 59* | 57* | 49* |
| 1981 | 52 | 53 | 61 | 66 | 60 | 44 |
| 1982 | 48 | 58 | 62 | 63 | 53 | 43 |
| | | | Mean Monthly Maximum Air Temperature | | | |
| 1968 | 65 | 73 | 82 | 74 | 64 | 48 |
| 1969 | 68 | 68 | 78 | 82 | 69 | 54 |
| 1970 | 65 | 74 | 80 | 83 | 59 | 48 |
| 1971 | 68 | 66 | 79 | 87 | 61 | 50 |
| 1972 | 68 | 75 | 78 | 84 | 64 | 53 |
| 1973 | 65 | 68 | 84 | 82 | 64 | 50 |
| 1974 | 56 | 76 | 76 | 66 | 62 | 51 |
| 1975 | | 61 | 78 | 69 | 64 | 48 |
| 1976 | 67 | 65 | 75 | 69 | 67 | 52 |
| 1977 | 55 | 77 | | 75 | 62 | 55 |
| 1978 | 59 | 74 | 80 | 74 | 65 | 61* |
| 1979 | | 75 | 85 | 84 | 74 | |
| 1980 | 67 | 71 | 80* | 73* | 67* | |
| 1981 | 63 | 63 | 73 | 80 | | 51 |
| 1982 | 61 | 71 | 74 | 76 | 64 | 52 |
| | | | Mean Monthly Minimum Air Temperature | | | |
| 1968 | 36 | 44 | 44 | 44 | 39 | 32 |
| 1969 | 34 | 41 | 42 | 53 | 50 | 42 |
| 1970 | 35 | 44 | 45 | 42 | 32 | 28 |
| 1971 | 36 | 40 | 43 | 47 | 34 | 29 |
| 1972 | 39 | 46 | 47 | 50 | 38 | 33 |
| 1973 | 34 | 41 | 44 | 43 | 37 | 32 |
| 1974 | 32 | 42 | 46 | 36 | 30 | 24 |
| 1975 | | 35 | 45 | 44 | 37 | 34 |
| 1976 | 37 | 41 | 47 | 46 | 40 | 33 |
| 1977 | 34 | 47 | | 50 | 44 | 37 |
| 1978 | 38 | 46 | 53 | 51 | 47 | 40* |
| 1979 | | 48 | 52 | 54 | 47 | |
| 1980 | 44 | 47 | 53* | 48* | 47* | |
| 1981 | 42 | 44 | 48 | 51 | | 36 |
| 1982 | 36 | 46 | 49 | 50 | 42 | 34 |

*Estimated values.

**Table 10.**—Precipitation for spacing study site (inches)

| Year | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| 1968 | 3.33 | 1.96 | 0.87 | 4.59 | 3.78 | 1.32 |
| 1969 | 1.32 | 5.49 | .22 | 0 | 1.15 | 1.80 |
| 1970 | .40 | 1.64 | 1.27 | 1.25 | .30 | 1.17 |
| 1971 | 1.53 | 2.50 | 1.67 | 0 | .48 | 2.38 |
| 1972 | .20 | 1.72 | .22 | .40 | .77 | .85 |
| 1973 | | 2.25 | .08 | 0 | 0 | .28 |
| 1974 | 2.22 | 0 | .02 | 1.15 | .42 | .24 |
| 1975 | | 1.65 | | | | |
| 1976 | 1.93 | 1.80 | 2.37 | 3.37 | .85 | .28 |

Precipitation was periodically measured from rain cans, beginning in 1978:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5-3-78 | to | 6-9-78 | 3.33 | 5-1-81 | to | 6-18-81 | 8.16 |
| 6-9-78 | to | 7-4-78 | | 6-18-81 | to | 7-17-81 | .50 |
| 7-4-78 | to | 8-4-78 | 1.83 | 7-17-81 | to | 8-13-81 | .38 |
| 8-4-78 | to | 9-14-78 | 3.66 | 8-13-81 | to | 9-11-81 | 1.15 |
| 9-14-78 | to | 10-19-78 | .20 | 9-11-81 | to | 10-4-81 | .95 |
| 5-17-79 | to | 6-12-79 | 1.39 | 4-30-82 | to | 5-28-82 | 1.48 |
| 6-12-79 | to | 6-27-79 | .66 | 5-28-82 | to | 7-22-82 | |
| 6-28-79 | to | 7-26-79 | .24 | 7-22-82 | to | 8-5-82 | .41 |
| 7-27-79 | to | 8-20-79 | .35 | 8-5-82 | to | 9-15-82 | |
| 8-20-79 | to | 10-30-79 | 1.77 | 9-15-82 | to | 10-20-82 | 1.79 |
| 5-6-80 | to | 6-5-80 | 5.07 | | | | |
| 6-5-80 | to | 8-7-80 | 4.10 | | | | |
| 8-7-80 | to | 9-29-80 | 4.21 | | | | |

**Table 11.**—Monthly air temperature and precipitation for Abbott Basin south and north sites

| Year | Abbott Basin south | | | | | | Abbott Basin north | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | May | June | July | Aug. | Sept. | Oct. | May | June | July | Aug. | Sept. | Oct. |
| | | | | | Mean Monthly Maximum Air Temperature (°F) | | | | | | | |
| 1958 | | 68 | 72 | 81 | 62 | 55 | | 69 | 75 | 82 | 64 | 55 |
| 1959 | 55 | 71 | 81 | 68 | 57 | 49 | 55 | 69 | 80 | 72 | 58 | 48 |
| 1960 | 55 | 68 | 87 | 69 | 69 | 52 | 55 | 67 | 85 | 70 | 70 | 54 |
| 1961 | 66 | 79 | 84 | 86 | 60 | 51 | | | | | | |
| 1962 | 60 | 72 | 78 | 75 | 69 | | | | | | | |
| 1963 | 62 | 67 | 74 | 79 | 72 | 60 | | | | | | |
| 1964 | 62 | 66 | 78 | 69 | 61 | 54 | | | | | | |
| | | | | | Mean Monthly Minimum Air Temperature (°F) | | | | | | | |
| 1958 | | 45 | 48 | 52 | 40 | 36 | | 46 | 50 | 54 | 42 | 37 |
| 1959 | 34 | 45 | 51 | 47 | 38 | 33 | 34 | 45 | 50 | 48 | 41 | 34 |
| 1960 | 35 | 44 | 52 | 44 | 38 | 33 | 35 | 44 | 54 | 48 | 41 | 35 |
| 1961 | 38 | 45 | 48 | 48 | 35 | 30 | | | | | | |
| 1962 | 38 | 40 | 43 | 44 | 36 | | | | | | | |
| 1963 | 34 | 42 | 42 | 43 | 40 | 34 | | | | | | |
| 1964 | 32 | 41 | 44 | 42 | 35 | 33 | | | | | | |
| | | | | | Total Precipitation (inches) | | | | | | | |
| 1958 | | 3.39 | 0.47 | 0.50 | 1.78 | 0.55 | | 3.00 | 0.60 | 0.30 | 1.75 | 0.40 |
| 1959 | 3.21 | .87 | .10 | 1.23 | 3.89 | 2.41 | 2.90 | 1.63 | .05 | .63 | 3.60 | 3.14 |
| 1960 | 3.26 | 1.33 | 0 | 3.83 | .42 | 2.07 | 2.96 | .85 | 0 | 3.52 | .14 | 1.74 |
| 1961 | .95 | .52 | 1.68 | .79 | 3.00 | 2.09 | | | | | | |
| 1962 | 2.62 | .82 | .45 | 1.25 | .56 | 1.50 | | | | | | |
| 1963 | .86 | 5.03 | .95 | .60 | 1.10 | 1.00 | | | | | | |
| 1964 | | 5.23 | 2.35 | 1.50 | 1.80 | 1.23 | | | | | | |

**Table 12.**—Monthly air temperature and precipitation for wartime cuttings

| Year | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| | | | Mean Monthly Maximum Temperatures (°F) | | | |
| 1961 | | 83 | 87 | 89 | 62 | 51 |
| 1962 | 60 | 73 | 80 | 75 | 68 | |
| 1963 | 67 | 72 | 82 | 84 | 76 | 59 |
| 1964 | 62 | 72 | 83 | 72 | 64 | 57 |
| | | | Mean Monthly Minimum Temperatures (°F) | | | |
| 1961 | | 45 | 46 | 47 | 35 | 30 |
| 1962 | 34 | 37 | 40 | 41 | 33 | |
| 1963 | 36 | 44 | 45 | 45 | 43 | 35 |
| 1964 | 36 | 43 | 46 | 44 | 37 | 34 |
| | | | Total Precipitation (inches) | | | |
| 1961 | 0.83 | 0.14 | 1.44 | 0.79 | 2.69 | 2.19 |
| 1962 | 2.36 | .55 | .22 | 1.60 | .85 | |
| 1963 | .72 | 4.07 | .57 | .38 | 1.44 | 1.52 |
| 1964 | 1.09 | 4.73 | 2.33 | 1.70 | 1.68 | 1.92 |

**Table 13.**—Monthly air temperature for 60-acre clearcut and 30-acre clearcut sites

| Year | May | June | July | Aug. | Sept. | Oct. |
|---|---|---|---|---|---|---|
| | | | Mean Monthly Maximum Temperatures (°F) | | | |
| 1971 | | | | 78* | 64 | 56 |
| 1972 | 65 | 71 | 74 | 82 | | 54 |
| 1973 | 59 | 60 | 73 | 81 | 65 | 50 |
| 1974 | 55 | 76 | 78 | 73 | 67 | 58 |
| 1975 | | 69 | 85 | 72 | 69 | |
| 1976 | 63 | 62 | 74 | 68 | 66 | 50 |
| 1977 | 60 | 80 | 78 | 76 | 63 | 57 |
| 1978 | 60 | 75 | 79 | 73 | 64 | 62* |
| 1979 | | 80 | 89 | | | |
| 1980 | 70 | 78 | 79 | 72 | 66 | |
| [1]1981 | 62 | 61 | 72 | 79 | 65 | 50 |
| | | | Mean Monthly Minimum Temperatures (°F) | | | |
| 1971 | | | | 53* | 45 | 41 |
| 1972 | 38 | 45 | 46 | 49 | | 31 |
| 1973 | 37 | 42 | 42 | 41 | 35 | 30 |
| 1974 | 33 | 42 | 42 | 40 | 33 | 29 |
| 1975 | | 42 | 50 | 44 | 38 | |
| 1976 | 30 | 36 | 42 | 42 | 35 | 28 |
| 1977 | 34 | 45 | 48 | 47 | 41 | 34 |
| 1978 | 41 | 45 | 47 | 46 | 43 | 33* |
| 1979 | | 43 | 47 | | | |
| 1980 | 42 | 45 | 49 | 45 | 43 | |
| [1]1981 | 41 | 42 | 47 | 49 | 41 | 34 |

*Based on fewer than 20 days.
[1]30-acre clearcut.

Table 14.—Mean monthly, mean monthly maximum, and mean monthly minimum air temperature for Coram Ranger Station (°F)

| Year | Mean monthly air temperature | | | | Mean monthly maximum air temperature | | | | Mean monthly minimun air temperature | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | June | July | Aug. | Sept. | June | July | Aug. | Sept. | June | July | Aug. | Sept. |
| 1934 | | 67 | 63 | 49 | | 87 | 86 | 65 | | 46 | 40 | 33 |
| 1935 | 56* | 62 | 59 | 57 | 74* | 82 | 78 | 75 | 37* | 44 | 39 | 39 |
| 1936 | 59 | 66 | 62 | 52 | 73 | 87 | 84 | 67 | 44 | 45 | 41 | 37 |
| 1937 | 56 | 64 | 59 | 55 | 71 | 83 | 77 | 73 | 42 | 45 | 42 | 36 |
| 1938 | 58 | 64 | 61 | 59 | 75 | 84 | 81 | 80 | 42 | 45 | 40 | 39 |
| 1939 | 52 | 63 | 62 | 54 | 64 | 82 | 84 | 69 | 40 | 44 | 39 | 38 |
| 1940 | 58 | 65 | 62 | 57 | 76 | 85 | 86 | 73 | 41 | 45 | 38 | 42 |
| 1941 | 57 | 66 | 63 | 48 | 72 | 86 | 81 | 58 | 42 | 47 | 45 | 38 |
| 1942 | 54 | 62 | 61 | 53 | 65 | 81 | 80 | 70 | 44 | 44 | 42 | 36 |
| 1943 | 50 | 62 | 61 | 53 | 62 | 82 | 82 | 74 | 38 | 43 | 40 | 32 |
| 1944 | 56 | 63 | 60 | 54 | 70 | 83 | 78 | 71 | 42 | 42 | 41 | 37 |
| 1945 | 55 | 64 | 64 | 54* | 68 | 84 | 86 | 70* | 42 | 43 | 41 | 37* |
| 1946 | 55 | 64 | 62 | 54 | 72 | 84 | 84 | 71 | 39 | 42 | 40 | 37 |
| 1947 | 57 | 66 | 62 | 56* | 70 | 88 | 81 | 73* | 44 | 43 | 42 | 40* |
| 1948 | 61 | 59 | 62 | 56 | 75 | 77 | 80 | 78 | 47 | 42 | 43 | 34 |
| 1949 | 57 | 62 | 63 | 52 | 74 | 82 | 87 | 74 | 40 | 42 | 39 | 31 |
| 1950 | 54* | 62 | 62 | 53 | 68* | 81 | 82 | 76 | 41* | 43 | 41 | 31 |
| 1951 | 54* | 63 | 60 | 50 | 69* | 84 | 81 | 68 | 39* | 42 | 39 | 32 |
| 1952 | 56 | 61 | 62 | 56 | 72 | 82 | 83 | 78 | 40 | 40 | 41 | 34 |
| 1953 | 54 | 62 | 62 | 55 | 69 | 86 | 82 | 75 | 39 | 39 | 41 | 35 |
| 1954 | 54* | 62 | 59 | 51 | 68* | 80 | 78 | 67 | 39* | 43 | 41 | 36 |
| 1955 | 55 | 60 | 60 | 54 | 73 | 76 | 83 | 72 | 37 | 44 | 36 | 35 |
| 1956 | 56* | 63 | 59 | 54 | 72* | 82 | 79 | 72 | 40* | 44 | 40 | 36 |
| 1957 | 58 | 63 | 60 | 55 | 72 | 83 | 80 | 76 | 44 | 44 | 40 | 34 |
| Average °F | 56 | 63 | 61 | 54 | 71 | 83 | 82 | 72 | 41 | 43 | 40 | 36 |
| Average °C | 13 | 17 | 16 | 12 | 22 | 28 | 28 | 22 | 5 | 6 | 4 | 2 |

*Based on fewer than 20 days.

Table 15.—Monthly precipitation for Coram Ranger Station (inches)

| Year | June | July | Aug. | Sept. |
|---|---|---|---|---|
| 1934 | | 0 | 0.25 | 0.90 |
| 1935 | 1.10 | 1.79 | .74 | .31 |
| 1936 | 1.56 | .21 | .18 | 1.44 |
| 1937 | 3.17 | .84 | 1.81 | 1.68 |
| 1938 | 1.79 | 1.27 | 1.74 | .74 |
| 1939 | 3.85 | .60 | .19 | 1.70 |
| 1940 | 1.26 | 2.19 | .20 | 1.90 |
| 1941 | 1.86 | .54 | 1.46 | 4.58 |
| 1942 | 3.82 | 2.56 | .79 | 1.33 |
| 1943 | 3.45 | .64 | .43 | 1.26 |
| 1944 | 1.09 | .27 | 2.46 | 2.28 |
| 1945 | 3.24 | .32 | .45 | 2.17 |
| 1946 | 2.73 | 1.05 | 1.48 | 2.08 |
| 1947 | 5.44 | .57 | 3.36 | 1.66* |
| 1948 | 3.52 | 3.75 | 1.44 | .02 |
| 1949 | .72 | 1.97 | .89 | 2.13 |
| 1950 | 1.77 | 1.73 | 1.75 | 1.33 |
| 1951 | 2.18 | 1.81 | 2.70 | 3.79 |
| 1952 | 3.44 | 2.11 | 1.16 | .52 |
| 1953 | 2.97 | .09 | 1.71 | .64 |
| 1954 | 2.92 | 2.58 | 4.60 | .87 |
| 1955 | 2.72 | 3.13 | 0 | 2.30 |
| 1956 | 2.68 | 1.74 | 2.86 | 1.19 |
| 1957 | 3.86 | .89 | .74 | .15 |
| Average inch | 2.66 | 1.36 | 1.39 | 1.54 |
| Average cm | 6.76 | 3.45 | 3.53 | 3.91 |

*Based on fewer than 20 days.

Table 16.—Monthly air temperature and precipitation for Desert Mountain Lookout

| Year | Mean monthly air temperature | | Mean monthly maximum air temperature | | Mean monthly minimum air temperature | | Total precipitation | |
|---|---|---|---|---|---|---|---|---|
| | July | Aug. | July | Aug. | July | Aug. | July | Aug. |
| | °F | | | | | | Inches | |
| 1936 | 66 | 61 | 77 | 72 | 55 | 51 | 0.25 | 0.35 |
| 1937 | 62 | 55 | 71 | 65 | 52 | 46 | 1.36 | 1.84 |
| 1938 | 61 | 56 | 70 | 65 | 52 | 48 | 1.32 | 1.30 |
| 1939 | 62 | 62 | 71 | 72 | 54 | 52 | .25 | .37 |
| 1940 | 60 | 61 | 70 | 71 | 51 | 51 | 2.31 | .10 |
| 1941 | 61 | [1]63 | 69 | 72 | 54 | 53 | .38 | [1] .51 |
| 1942 | [2]56 | 59 | 64 | 69 | 47 | 50 | [2]2.03 | [3] .90 |
| 1943 | 59 | 59 | 69 | 69 | 49 | 48 | .67 | .37 |
| 1944 | 58 | 55 | 68 | 65 | 49 | 46 | .37 | 2.08 |
| 1945 | 60 | 60 | 70 | 70 | 51 | 50 | .15 | .76 |
| 1946 | [2]61 | [3]58 | 72 | 66 | 51 | 50 | [2] .28 | [4] .84 |
| 1947 | [2]62 | [1]57 | 72 | 68 | 52 | 46 | .51 | [1]2.27 |
| 1948 | | [5]56 | | 67 | | 45 | | [5] .90 |
| 1949 | [2]56 | 61 | 67 | 72 | 45 | 50 | [2]1.97 | .65 |
| 1950 | [2]56 | 58 | 66 | 68 | 47 | 48 | [2]1.23 | 1.25 |
| 1951 | 60 | 56 | 70 | 66 | 50 | 47 | 1.58 | [3]2.86 |
| 1952 | [2]56 | 58 | 67 | 68 | 46 | 48 | [2]1.31 | [3]1.23 |
| 1953 | 62 | 59 | 73 | 70 | 51 | 49 | .11 | 1.32 |
| 1954 | [2]60 | [4]56 | 69 | 63 | 51 | 49 | 1.38 | [4]3.89 |
| 1955 | [3]56 | 61 | 65 | 72 | 46 | 50 | [3]4.45 | 0 |
| 1956 | 60 | 57 | 69 | 67 | 50 | 48 | 1.67 | 3.04 |
| 1957 | 57 | 56 | 69 | 68 | 46 | 45 | 1.49 | .88 |
| 1958 | 58 | 64 | 68 | 76 | 48 | 53 | 1.15 | .75 |
| 1959 | 60 | 55 | 73 | 65 | 48 | 45 | .12 | 1.66 |
| 1960 | 67 | [3]55 | 77 | 64 | 57 | 45 | .09 | [4]3.70 |
| 1961 | 61 | 67 | 72 | 78 | 50 | 56 | 2.13 | 1.36 |
| 1962 | 55 | 54 | 68 | 66 | 42 | 42 | .95 | 1.74 |
| 1963 | 57 | 60 | 67 | 72 | 47 | 49 | 1.10 | .84 |
| 1964 | 56 | 49 | 69 | 60 | 43 | 39 | 2.97 | 2.02 |
| 1965 | 61 | [3]57 | 70 | 66 | 52 | 49 | 1.15 | [1]2.66 |
| 1966 | 58 | 56 | 68 | 67 | 48 | 46 | 2.16 | 1.55 |
| 1967 | [3]62 | 66 | 74 | 78 | 51 | 55 | .29 | .07 |
| 1968 | 60 | | 71 | | 48 | | 1.16 | [6]2.10 |
| 1969 | 57 | 62 | 67 | 74 | 47 | 49 | .44 | 0 |
| 1970 | 62 | 62 | 72 | 74 | 52 | 51 | 2.61 | 1.35 |
| 1971 | 57 | 66 | 68 | 77 | 45 | 56 | 1.69 | 1.64 |
| 1972 | 54 | 61 | 65 | 72 | 44 | 51 | 3.08 | 1.67 |
| 1973 | 59 | 61 | 72 | 73 | 46 | 49 | .14 | 1.02 |

[1]7-9 days missing at end of month
[2]July 11-31.
[3]Includes estimates for missing days.
[4]4-5 days missing at end of month.
[5]August 1-20.
[6]August 1-16.

**Table 17.**—Mean monthly air temperature and monthly precipitation for Hungry Horse Dam, 1968-81

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Mean Monthly Air Temperature (°F) | | | | | | | |
| 1968 | 24 | 30 | 39 | 40 | 50 | 57 | 64 | 61 | 53 | 41 | 33 | 19 | 43 |
| 1969 | 12 | 25 | 31 | 45 | 54 | 58 | 64 | 65 | 56 | 39 | 34 | 28 | 42 |
| 1970 | 23 | 31 | 32 | 38 | 52 | 64 | 66 | 65 | 49 | 39 | 30 | 26 | 43 |
| 1971 | 23 | 28 | 30 | 41 | 52 | 54 | 62 | 69 | 49 | 40 | 34 | 22 | 42 |
| 1972 | 18 | 27 | 37 | 40 | 51 | 59 | 61 | 66 | 50 | 39 | 33 | 21 | 42 |
| 1973 | 19 | 24 | 36 | 41 | 52 | 58 | 67 | 67 | 54 | 44 | 29 | 30 | 43 |
| 1974 | 21 | 31 | 31 | 42 | 47 | 62 | 65 | 63 | 53 | 44 | 35 | 31 | 44 |
| 1975 | 23 | 20 | 28 | 35 | 48 | 57 | 67 | 59 | 54 | 42 | 31 | 29 | 41 |
| 1976 | 27 | 30 | 29 | 43 | 53 | 55* | 65 | 62 | 56* | 43 | 32 | 30 | 44* |
| 1977 | 21 | 32 | 33 | 45 | 50 | 63 | 62 | 63 | 51 | 43 | 31 | 22 | 43 |
| 1978 | 21 | 28 | 35 | 44 | 48 | 60 | 65 | 62 | 54 | 44 | 27 | 20 | 42 |
| 1979 | 3 | 24 | 34 | 42 | 52 | 61 | 68 | 67 | 58 | 46 | 29 | 32 | 43 |
| 1980 | 15 | 27 | 30 | 45 | 55 | 58 | 65 | 59 | 53 | 43 | 34 | 28 | 43 |
| 1981 | 29 | 30 | 39 | 44 | 54 | 54 | 64 | 69 | 56 | 42 | 34 | 27 | 45 |
| | | | | | | Total Precipitation (inches) | | | | | | | |
| 1968 | 3.13 | 3.21 | 2.85 | 1.37 | 3.37 | 2.91 | 2.17 | 3.71 | 6.57 | 4.83 | 3.63 | 3.75 | 41.50 |
| 1969 | 7.85 | .83 | 1.17 | 1.74 | 2.29 | 5.26 | .46 | .14 | 3.05 | 2.82 | 1.83 | 2.24 | 29.68 |
| 1970 | 6.20 | 3.52 | 2.92 | 1.79 | 2.24 | 3.72 | 3.30 | .58 | 3.56 | 3.18 | 3.83 | 4.51 | 39.35 |
| 1971 | 5.49 | 1.95 | 2.38 | 1.27 | 3.24 | 5.26 | 2.23 | 1.60 | 1.76 | 4.04 | 2.99 | 4.10 | 36.31 |
| 1972 | 5.39 | 4.03 | 2.51 | 2.71 | 2.23 | 3.69 | 3.10 | 2.29 | 3.00 | 3.07 | 1.00 | 4.89 | 37.91 |
| 1973 | 2.24 | 1.09 | 1.04 | 1.63 | 2.39 | 2.85 | .16 | 1.01 | 2.63 | 4.10 | 10.84 | 4.97 | 34.95 |
| 1974 | 7.50 | 3.82 | 4.23 | 2.28 | 2.89 | 3.16 | 1.66 | 1.07 | 2.41 | .42 | 4.11 | 2.81 | 36.36 |
| 1975 | 3.73 | 3.61 | 2.71 | 1.21 | 2.57 | 3.38 | 1.57 | 4.07 | 1.10 | 5.89 | 3.09 | 3.81 | 36.74 |
| 1976 | 3.75 | 3.10 | 1.50 | 2.75 | 2.89 | 3.66 | 2.98 | 4.74 | 1.36 | .90 | 2.18 | 1.93 | 31.74 |
| 1977 | 1.63 | 1.70 | 2.20 | 1.10 | 2.74 | .68 | 3.84 | 3.04 | 3.81 | 1.00 | 3.95 | 7.16 | 32.85 |
| 1978 | 3.05 | 1.44 | 1.27 | 2.32 | 4.28 | 2.44 | 1.69 | 4.13 | 2.34 | .68 | 2.89 | 3.01 | 29.54 |
| 1979 | 2.17 | 4.87 | 2.68 | 2.60 | 3.08 | 1.51 | .70 | 1.30 | .68 | 3.04 | .60 | 3.87 | 27.10 |
| 1980 | 2.94 | 2.54 | 3.20 | 2.44 | 4.19 | 5.48 | 1.50 | 3.61 | 3.19 | 1.32 | 2.82 | 7.11 | 40.34 |
| 1981 | 1.20 | 3.91 | 1.05 | 4.55 | 6.17 | 6.83 | 2.45 | .87 | 1.72 | 1.04 | 2.95 | 4.06 | 36.80 |

*Estimated by regression techniques.

**Table 18.**—Mean monthly air temperature and monthly precipitation for West Glacier, 1968-81

| Year | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Mean Monthly Air Temperature (°F) | | | | | | | |
| 1968 | 22 | 30 | 39 | 40 | 49 | 57 | 64 | 59 | 52 | 41 | 33 | 18 | 42 |
| 1969 | 12 | 24 | 32 | 44 | 52 | 58 | 62 | 63 | 55 | 39 | 34 | 27 | 42 |
| 1970 | 22 | 29 | 31 | 38 | 51 | 62 | 64 | 62 | 47 | 38 | 30 | 24 | 42 |
| 1971 | 21 | 28 | 30 | 41 | 52 | 55 | 62 | 67 | 49 | 40 | 32 | 20 | 41 |
| 1972 | 16 | 27 | 36 | 39 | 50 | 59 | 60 | 64 | 49 | 40 | 33 | 19 | 41 |
| 1973 | 19 | 25 | 36 | 41 | 51 | 58 | 65 | 65 | 54 | 44 | 29 | 28 | 43 |
| 1974 | 21 | 30 | 32 | 43 | 47 | 61 | 64 | 61 | 53 | 44 | 33 | 29 | 43 |
| 1975 | 22 | 20 | 29 | 36 | 48 | 54 | 68 | 59 | 52 | 41 | 30 | 28 | 41 |
| 1976 | 26 | 29 | 30 | 42 | 52 | 54 | 63 | 61 | 54 | 43 | 32 | 29 | 43 |
| 1977 | 20 | 31 | 34 | 44 | 49 | 60 | 62 | 61 | 50 | 42 | 29 | 20 | 42 |
| 1978 | 21 | 27 | 35 | 43 | 48 | 59 | 63 | 59 | 54 | 42 | 26 | 17 | 41 |
| 1979 | 4 | 24 | 33 | 42* | 51 | 58 | 65 | 65 | 56 | 44 | 28 | 30 | 42* |
| 1980 | 14 | 27 | 30 | 46 | 53 | 56 | 61 | 57 | 53 | 44 | 33 | 26 | 42 |
| 1981 | 28 | 28 | 37 | 43 | 52 | 53 | 62 | 65 | 54 | 42 | 34 | 25 | 44 |
| | | | | | | Total Precipitation (inches) | | | | | | | |
| 1968 | 1.97 | 2.58 | 1.57 | 1.15 | 4.94 | 3.22 | 0.86 | 3.66 | 6.17 | 4.16 | 2.38 | 4.04 | 36.70 |
| 1969 | 6.67 | .66 | .71 | 1.61 | 1.90 | 4.55 | .48 | .01 | 3.20 | 1.98 | 1.16 | 1.64 | 24.57 |
| 1970 | 5.31 | 3.56 | 1.97 | 1.38 | 3.41 | 3.73 | 1.73 | .70 | 3.21 | 1.93 | 4.74 | 3.72 | 35.39 |
| 1971 | 5.55 | 2.14 | 2.28 | .95 | 2.84 | 5.94 | 1.75 | 1.91 | 1.24 | 2.88 | 3.77 | 4.90 | 36.15 |
| 1972 | 5.13 | 5.07 | 2.76 | 1.57 | 2.13 | 2.69 | 1.99 | 1.60 | 1.62 | 1.05 | 1.20 | 4.83 | 31.64 |
| 1973 | 2.48 | 1.07 | 1.26 | 1.59 | 2.09 | 2.32 | .22 | 1.14 | 2.62 | 2.59 | 4.63 | 3.27 | 25.28 |
| 1974 | 5.77 | 2.98 | 2.87 | 2.47 | 2.18 | 2.24 | 1.37 | 1.12 | 1.32 | .14 | 4.53 | 2.52 | 29.51 |
| 1975 | 4.45 | 2.58 | 1.67 | 1.17 | 2.19 | 2.54 | 2.00 | 4.06 | 1.14 | 4.17 | 2.81 | 3.78 | 32.56 |
| 1976 | 3.75 | 3.08 | .96 | 1.88 | 2.83 | 3.29 | 3.05 | 4.09 | .80 | .30 | 1.22 | 1.91 | 27.16 |
| 1977 | 1.29 | 1.40 | 2.16 | .33 | 2.13 | .75 | 3.13 | 2.55 | 3.24 | 1.17 | 2.70 | 6.02 | 26.87 |
| 1978 | 2.83 | 1.06 | .51 | 2.43 | 3.68 | 2.12 | 3.04 | 4.48 | 1.64 | .64 | 2.14 | 2.56 | 27.13 |
| 1979 | 1.05 | 3.59 | 1.23 | 2.23 | 2.66 | 1.47 | 1.12 | .85 | .80 | 2.37 | .65 | 2.64 | 20.66 |
| 1980 | 2.26 | 2.04 | 1.15 | 1.24 | 3.96 | 5.12 | 1.62 | 2.37 | 2.27 | .86 | 2.89 | 7.72 | 33.50 |
| 1981 | 1.32 | 2.46 | 1.32 | 2.55 | 3.96 | 6.83 | 1.67 | 1.70 | 1.14 | .90 | 2.76 | 2.43 | 29.04 |

*Estimated by regression techniques.

**Table 19.**—Mean daily solar irradiance by month for residue utilization study sites (MJ $m^{-2}$)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | |
| 1975 | | | | | 15 | 15 | 18 | 14 | 14 | 6 | 4 | 2 |
| 1976 | 3 | 5 | 10 | 12 | 16 | 14 | 17 | 14 | 14 | 8 | 4 | 3 |
| 1977 | 3 | 6 | 8 | 17 | 14 | 20 | 17 | 15 | 11 | | | |
| 1978 | | | | 12 | 12 | 20 | 19 | 14 | 9* | 7* | 3 | |
| 1979 | | | | | | 17* | 19 | | 13* | 6 | 3 | |
| 1980 | | | | | | 16 | 16* | | | 7 | 2 | |
| 1981 | | | 11 | | 14 | 14 | 20* | | | 6 | 3 | |
| Uncut | | | | | | | | | | | | |
| 1973 | | | | | | | | 4 | 4 | 2 | 1 | 1 |
| 1974 | 1 | 1 | 3 | 4 | 5 | 8 | 8 | 6 | 5 | 3 | 1 | 0 |
| 1975 | 0 | 1 | 2 | 3 | 4 | 4 | 6 | 4 | 3 | 1 | 1 | 0 |
| 1976 | 1 | 1 | 2 | 2 | 5 | 4 | 5 | 3 | 2 | 1 | 1 | 1 |
| 1977 | 1 | 1 | 1 | | | | 5 | 3 | 2 | | | |
| Shelterwood | | | | | | | | | | | | |
| 1974 | | | | | | | | 8 | 8 | 5 | 2 | 1 |
| 1975 | 2 | 3 | 6 | 8 | 10 | 9 | 12 | 8 | 8 | 3 | 2 | 1 |
| 1976 | 2 | 3 | 6 | 8 | 11 | 10 | 11 | 9 | 9 | 5 | 3 | 2 |
| 1977 | 2 | 4 | 5 | 11 | 10 | 13 | 10 | 10 | 7 | | | |
| Clearcut | | | | | | | | | | [1] | | |
| 1973 | | | | | | | | | | 1 | 0 | 0 |
| 1974 | 0 | 0 | 1 | 3 | 4 | 7 | 6 | | | 9 | 3 | 1 |
| 1975 | 3 | 4 | 7 | 11 | 14 | 14 | 19 | 14 | 13 | 5 | 4 | 2 |
| 1976 | 3 | 4 | 7 | 12 | 16 | 13 | 18 | 13 | 13 | 8 | 4 | 3 |
| 1977 | 4 | 6 | 8 | 16 | 14 | 20 | 17 | 15 | 10 | 8 | 3 | 2 |
| 1978 | 2 | 5 | 10 | 12 | 11 | 22 | 19 | 14 | 8* | 7* | 4 | |
| 1979 | | | | | | 18* | 20 | | 13* | 7 | 3 | |
| 1980 | | | | 14 | 18* | 18 | 17* | | | 7 | 2 | |
| 1981 | | | 10 | | 14 | 13 | 21* | | | 6 | 3 | |
| Abbott Creek | | | | | | | | | | | | |
| 1974 | 2 | 2 | 8 | 12 | 12 | 19 | 18 | 16 | 13 | 9 | 3 | 2 |
| 1975 | 2 | 4 | 7 | 12 | 13 | 13 | 19 | 14 | 13 | 6 | 3 | 2 |
| 1976 | 3 | 5 | 8 | 11 | 16 | 15 | 17 | 13 | 13 | 7 | 4 | 2 |
| 1977 | 3 | 5 | 7 | 15 | 13 | 19 | 16 | 13 | 10 | | | |

Note: 1 MJ $m^{-2}$ = 23.9 CAL $cm^{-2}$
*Estimated from partial records.
[1] Period before clearcutting.

**Table 20.**—Maximum daily solar irradiance by month for residue utilization study sites ($MJ\ m^{-2}$)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | |
| 1975 | | | | | 21 | 25 | 24 | 22 | 19 | 15 | 10 | 8 |
| 1976 | 8 | 11 | 18 | 22 | 23 | 24 | 24 | 20 | 19 | 15 | 9 | 7 |
| 1977 | 8 | 12 | 19 | 23 | 24 | 26 | 25 | 22 | 20 | | | |
| 1978 | | | | 21 | 25 | 28 | 26 | 23 | 18 | 11 | 7 | |
| 1979 | | 10 | 20 | | 24 | 22 | 23 | 22 | | 12 | 8 | |
| 1980 | 10 | 11 | | | | 25 | 24 | | | 12 | 6 | |
| 1981 | | 11 | 16 | | 25 | 26 | 26 | | | 11 | 8 | |
| Uncut | | | | | | | | | | | | |
| 1973 | | | | | | | | 5 | 7 | 4 | 3 | 3 |
| 1974 | 4 | 2 | 6 | 8 | 9 | 10 | 11 | 10 | 8 | 5 | 2 | 1 |
| 1975 | 2 | 3 | 4 | 5 | 8 | 8 | 8 | 9 | 5 | 3 | 2 | 1 |
| 1976 | 2 | 2 | 3 | 5 | 8 | 8 | 8 | 5 | 4 | 2 | 2 | 2 |
| 1977 | 2 | 2 | 2 | | | | 10 | 6 | 4 | | | |
| Shelterwood | | | | | | | | | | | | |
| 1974 | | | | | | | | 12 | 13 | 6 | 5 | 3 |
| 1975 | 4 | 8 | 14 | 14 | 17 | 15 | 15 | 16 | 12 | 7 | 6 | 3 |
| 1976 | 5 | 6 | 11 | 15 | 15 | 16 | 14 | 16 | 14 | 8 | 6 | 4 |
| 1977 | 5 | 6 | 14 | 18 | 15 | 18 | 15 | 14 | 13 | | | |
| Clearcut | | | | | | | | | | [1] | | |
| 1973 | | | | | | | | | | 2 | 2 | 1 |
| 1974 | 1 | 1 | 4 | 6 | 8 | 10 | 10 | | | 11 | 7 | 6 |
| 1975 | 8 | 14 | 15 | 22 | 23 | 25 | 24 | 22 | 17 | 13 | 9 | 6 |
| 1976 | 7 | 9 | 15 | 22 | 24 | 24 | 23 | 21 | 18 | 13 | 8 | 7 |
| 1977 | 8 | 13 | 18 | 22 | 24 | 25 | 25 | 22 | 19 | 14 | 7 | 6 |
| 1978 | 6 | 12 | 18 | 22 | 23 | 27 | 26 | 23 | 17 | 11 | 7 | |
| 1979 | | | 13 | | 26 | 24 | 24 | 23 | | 13 | 8 | |
| 1980 | 10 | 16 | 12 | 23 | 26 | 28 | 28 | | | 11 | 6 | |
| 1981 | | 14 | 15 | | 25 | 27 | 26 | | | 11 | 8 | |
| Abbott Creek | | | | | | | | | | | | |
| 1973 | | | | | | | | | | | | 4 |
| 1974 | 7 | 8 | 18 | 21 | 22 | 24 | 24 | 21 | 20 | 12 | 7 | 5 |
| 1975 | 6 | 16 | 14 | 21 | 20 | 24 | 24 | 22 | 17 | 12 | 6 | 6 |
| 1976 | 7 | 11 | 15 | 20 | 23 | 24 | 22 | 20 | 16 | 14 | 7 | 5 |
| 1977 | 8 | 10 | 18 | 20 | 23 | 24 | 25 | 20 | 16 | | | |

Note: 1 $MJ\ m^{-2}$ = 23.9 $CAL\ cm^{-2}$
[1]Period before clearcutting.

Table 21.—Mean daily net irradiance by month for residue utilization study sites (Langleys)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | |
| 1975 | | | | | | 276 | 290 | 202 | 189 | 46 | 7 | 9 |
| 1976 | 13 | 4 | 37 | 163 | 248 | 254 | 256 | 209 | 189 | 74 | 17 | -29 |
| 1977 | 9 | 19 | 30 | 165 | 198 | 241 | 224 | 207 | 135 | 80 | 11 | -2 |
| 1978 | -4 | -6 | 52 | 194 | 170 | 300* | | 176 | 132* | 54* | | |
| 1979 | | | | | | | 265 | | 151* | 62 | | |
| Uncut | | | | | | | | | | | | |
| 1973 | | | | | | | | | | 19 | 3 | -1 |
| 1974 | | | | 67 | 82 | 162 | 205 | 135 | 55 | 9 | 20 | 9 |
| 1975 | 9 | 11 | 28 | | | | | 54 | 28 | 33 | 17 | 9 |
| 1976 | 12 | 9 | 23 | 64 | 104 | 91 | 85 | 31 | 9 | 10 | 20 | -8 |
| 1977 | 8 | 22 | 14 | 46 | 44 | | | | | | | |
| Shelterwood | | | | | | | | | | | | |
| 1974 | | | | | | | | 134 | 126 | 28 | -5 | -15 |
| 1975 | 9 | 0 | 22 | 41 | 174 | 205 | 147 | 120 | 117 | 50 | -1 | 7 |
| 1976 | 20 | 11 | 43 | 76 | 192 | 140 | 139 | 122 | 135 | 38 | 3 | -16 |
| 1977 | -11 | 13 | 12 | 88 | 135 | | | | | | | |
| Clearcut | | | | | | | | | | [1] | | |
| 1973 | | | | | | | | | | | 22 | 9 |
| 1974 | 2 | -7 | -4 | 21 | 57 | 144 | 134 | | | 137 | 16 | -4 |
| 1975 | 2 | 23 | 29 | 88 | 222 | 211 | 263 | 183 | 158 | 61 | 4 | -3 |
| 1976 | 8 | -8 | 34 | 114 | 286 | 231 | 271 | 211 | 168 | 58 | 1 | -32 |
| 1977 | -18 | -14 | 8 | 146 | 206 | 272 | 235 | 246 | 172 | 119 | | |

*Estimated from partial records.
[1] Period before clearcutting.

Table 22.—Mean daily litter surface temperature by month for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clearcut-B | | | | | | | | | | | | |
| 1975 | | | | | | | 68 | 57 | 55 | 39 | 37 | |
| 1976 | | | | | 57 | 54 | 61 | 57 | 48 | 36 | 34 | 28 |
| 1977 | 30 | 32 | 32 | 48 | | | | | | | | 32 |
| 1978 | 32 | 32 | 32 | 32* | 43 | 54* | 55 | 54 | 50 | 37 | 32 | 32 |
| 1979 | 32 | 32 | 32 | | | 48* | 57 | 61* | 50* | 41 | 30 | 32 |
| 1980 | 32 | 32 | 32 | 34 | 45* | 54 | 59* | | | 39 | 30 | 32 |
| 1981 | 32 | 32 | 32 | | 48 | 46 | 57* | | | 34 | 32 | 32 |
| Clearcut-U | | | | | | | | | | | | |
| 1975 | | | | | | | 68 | 59 | 54 | 37 | 37 | 32 |
| 1976 | | | | | 55 | 54 | 64 | 59 | 48 | 34 | 32 | 30 |
| 1977 | 30 | 30 | 32 | 50 | 52 | 61 | | | | | | 32 |
| 1978 | 32 | 32 | 32 | 34* | 45 | 66* | 68 | 59 | 52 | 39 | 32 | 32 |
| 1979 | 32 | 32 | 32 | | | 61* | 70 | 75* | 54* | 39 | 25 | 30 |
| 1980 | 30 | 30 | 32 | 36 | 48* | 54 | 57* | | | 41 | 32 | 32 |
| 1981 | 32 | 32 | 32 | | 48 | 50 | 59* | | | 36 | 34 | 32 |
| Clearcut Block 13-B | | | | | | | | | | | | |
| 1978 | 32 | 32 | | 41* | 45 | 59* | | | | | | |
| 1979 | | | | | | 48 | 59 | 61* | 41* | 36* | | |
| 1980 | | | | | 45* | 54 | 57* | | | | | |
| Clearcut Block 13-U | | | | | | | | | | | | |
| 1978 | 32 | 32 | | 43* | 46 | 57* | 63 | 59 | 54* | 41* | 33 | 33 |
| 1979 | 32 | 32 | 32 | | | 57 | 66 | 70* | 57* | 45 | 31 | 32 |
| 1980 | 32 | 32 | 32 | 41 | 54* | 57 | 61* | | | | | |
| Uncut | | | | | | | | | | | | |
| 1975 | | | | | | | 63 | 54 | 46 | 37 | 34 | 32 |
| 1976 | | | | | 43 | 46 | 57 | 54 | 45 | 36 | 34 | 30 |
| 1977 | 30 | 30 | 30 | 37 | 45 | 52 | | | | | | |

*Estimated from partial records.
Note: B = area burned; U = area unburned.

**Table 23.**—Mean monthly maximum litter surface temperature[1] for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clearcut-B | | | | | | | | | | | | |
| 1975 | | | | | | | 113 | 88 | 109 | 55 | 52 | |
| 1976 | | | | | 111 | 97 | 86 | 79 | 73 | 43 | 39 | 28 |
| 1977 | 30 | 32 | | 84 | | | | | | | | 32 |
| 1978 | 32 | 32 | 32* | 32 | 64 | 75 | 66 | 66 | 57 | 45 | 34 | 32 |
| 1979 | 32 | 32 | 32 | | | 59 | 72 | | 68* | 50 | 30 | 32 |
| 1980 | 32 | 32 | 32 | 37 | 61* | 86 | 93* | | | 57 | 37 | 32 |
| 1981 | 32 | 32 | 32 | | 73 | 68 | 93* | | | 54 | 41 | 32 |
| Clearcut-U | | | | | | | | | | | | |
| 1975 | | | | | | | 117 | 99 | 106* | 52 | 50 | 32 |
| 1976 | | | | | 109 | 93 | 106 | 100 | 91 | 41 | 37 | 30 |
| 1977 | 30 | 32 | | 100 | 97 | 106 | | | | | | |
| 1978 | 34 | 34 | 32* | 36 | 66 | 129 | 117 | 99 | 72 | 61 | 36 | 32 |
| 1979 | 32 | 32 | 32 | | | 111 | 124 | | 99* | 61 | 30 | 32 |
| 1980 | 32 | 32 | 32 | 41 | 81* | 86 | 93* | | | 55 | 36 | 32 |
| 1981 | 32 | 32 | 32 | | 72 | 66 | 102* | | | 46 | 37 | 32 |
| Clearcut Block 13-B | | | | | | | | | | | | |
| 1978 | 32 | 32 | | 55* | 61 | 90* | | | | | | |
| 1979 | | | | | 86* | 77* | 100 | 109* | 68* | 57* | | |
| 1980 | | | | 70* | 79* | 82 | 86* | | | | | |
| Clearcut Block 13-U | | | | | | | | | | | | |
| 1978 | 32 | 32 | | 66* | 72 | 93* | 100 | 95 | 70* | 75* | 36 | 34 |
| 1979 | 34 | 32 | 32 | | 100* | 95* | 118 | 140* | 117 | 75 | 39 | 32 |
| 1980 | 32 | 32 | 32 | 57 | 104* | 90 | 100* | | | | | |
| Uncut | | | | | | | | | | | | |
| 1975 | | | | | | | 99 | 73 | 55 | 41 | 36 | 32 |
| 1976 | | | | | 70 | 68 | 73 | 63 | 52 | 37 | 36 | 30 |
| 1977 | 30 | 32 | | 55 | 66 | 77 | | | | | | |

[1]Mean monthly maximum temperature was obtained by dividing the sum of the daily maximum temperatures by the number of days readings were available.
*Estimated from partial records.
Note: B = area burned; U = area unburned.

**Table 24.**—Mean monthly minimum litter surface temperature[1] for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clearcut-B | | | | | | | | | | | | |
| 1975 | | | | | | | 46 | 41 | 32 | 30 | 32 | |
| 1976 | | | | | 23 | 36 | 48 | 46 | 36 | 28 | 30 | 28 |
| 1977 | 28 | 32 | | 30 | | | | | | | | 32 |
| 1978 | 32 | 32 | 32 | 32 | 32 | 39 | 46 | 45 | 45 | 32 | 32 | 32 |
| 1979 | 32 | 32 | 32 | 32* | 36* | 39 | 45 | 46* | 39* | 34 | 28 | 32 |
| 1980 | 32 | 32 | 32 | 32 | 36* | 37 | 41* | | | 32 | 25 | 30 |
| 1981 | 30 | 32 | 32 | | 34 | 36 | 39* | | | 25 | 28 | 32 |
| Clearcut-U | | | | | | | | | | | | |
| 1975 | | | | | | | 45 | 39 | 32 | 30 | 30 | 32 |
| 1976 | | | | | 23 | 34 | 45 | 43 | 32 | 27 | 25 | 30 |
| 1977 | 28 | 30 | | 27 | 28 | 39 | | | | | | 32 |
| 1978 | 32 | 32 | 32 | 32 | 34 | 36 | 45 | 43 | 45 | 32 | 30 | 32 |
| 1979 | 32 | 32 | 32 | 32* | 36* | 39 | 45 | 45* | 34* | 28 | 21 | 30 |
| 1980 | 30 | 30 | 32 | 32 | 30* | 39 | 45* | | | 34 | 30 | 30 |
| 1981 | 32 | 32 | 32 | | 37 | 41 | 45* | | | 30 | 30 | 32 |
| Clearcut Block 13-B | | | | | | | | | | | | |
| 1978 | 30 | 30 | | 33* | 34 | 39* | | | | | | |
| 1979 | | | | | 27* | 32* | 36 | 36* | 25* | 21 | | |
| 1980 | | | | 36* | 27* | 39 | 43* | | | | | |
| Clearcut Block 13-U | | | | | | | | | | | | |
| 1978 | 32 | 32 | | 32* | 34 | 41* | 46 | 45 | 46* | 30 | 32 | 33 |
| 1979 | 32 | 32 | 32* | | 34* | 39 | 41 | 41* | 34* | 32 | 28 | 32 |
| 1980 | 32 | 32 | 32 | 32 | 32* | 39 | 45* | | | | | |
| Uncut | | | | | | | | | | | | |
| 1975 | | | | | | | 52 | 48 | 41 | 34 | 34 | 32 |
| 1976 | | | | | 34 | 39 | 50 | 48 | 41 | 34 | 30 | 30 |
| 1977 | 28 | 30 | | 32 | 36 | 45 | | | | | | |

[1]Mean monthly minimum temperature was obtained by dividing the sum of the daily minimum temperatures by the number of days readings were available.
*Estimated from partial records.
Note: B = area burned; U = area unburned.

**Table 25.**—Mean monthly soil temperature at a depth of 1 inch for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | | |
| 1975 | | | | | | 50 | 65 | 55 | 51 | 38 | 31 | 27 | 40* |
| 1976 | 26 | 27 | 27 | 33 | 49 | 51 | 59 | 56 | 51 | 40 | 29 | 26 | 40 |
| 1977 | 26 | 27 | 29 | 40 | 49 | 59 | 60 | 59 | 49 | 40 | 30 | 28 | 41 |
| 1978 | 29 | 29 | 29 | 37 | 42 | 55 | 60 | 60 | 56 | 41 | 33 | 33 | 44 |
| 1979 | 32 | 32 | 32* | | | 58 | | | 60 | 46 | 32 | 32 | 45* |
| 1980 | 32 | 32 | 32 | 40 | | 57 | 60 | | | 46 | 39 | 36 | 44* |
| 1981 | 35 | 35 | 38 | | 54 | 56 | 62* | | | 45 | 39 | 33 | 46* |
| Uncut | | | | | | | | | | | | | |
| 1974 | | | | | | 60 | 62 | 60 | 53 | 45 | 34 | 31 | 45* |
| 1975 | 31 | 31 | 32 | 33 | 40 | 48 | 60 | 53 | 50 | 41 | 35 | 31 | 41 |
| 1976 | 30 | 28 | 30 | 31 | 42 | 46 | 54 | 52 | 50 | 43 | 35 | 31 | 39 |
| 1977 | 27 | 30 | 31 | 36 | 43 | 54 | 55 | 57 | 50 | 42 | 34 | 32 | 40 |
| 1978 | 32 | 33 | 34 | 38 | 42 | 51 | 55 | 56 | 49 | | | | 41* |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | 58 | 49 | 40 | 33 | 32 | 42* |
| 1975 | 31 | 32 | 32 | 33 | 39 | 50 | 60 | 54 | 50 | 39 | 34 | 31 | 40 |
| 1976 | 32 | 32 | 33 | 32 | 46 | 51 | 60 | 58 | 54 | 41 | 33 | 32 | 42 |
| 1977 | 32 | 32 | 33 | 37 | 47 | 58 | 59 | 59 | 51 | 42 | 34 | 33 | 42 |
| 1978 | 33 | 34 | 34 | 35 | 43 | 53 | 58 | 55 | 50 | 44 | 32 | 32 | 42 |
| 1979 | 32 | | | | | | | | | | | | |
| 1980 | | | | | | 53 | 54 | | | 40 | 33 | 32 | 43* |
| 1981 | 31 | 32 | 32 | | 46 | 54 | 63 | | | 42 | 35 | 33 | 43* |
| Clearcut | | | | | | | | | | | | | |
| 1974 | | | | | | 59 | 54 | | | 38 | 31 | 29 | 40* |
| 1975 | 29 | 30 | 28 | 30 | 36 | 48 | 60 | 52 | 46 | 35 | 28 | 27 | 38 |
| 1976 | 28 | 28 | 28 | 28 | 46 | 49 | 59 | 56 | 50 | 38 | 29 | 28 | 38 |
| 1977 | 27 | 28 | 28 | 34 | 45 | 60 | 60 | 58 | 48 | 38 | 29 | 28 | 40 |
| 1978 | 28 | 28 | 28 | 29 | 41 | 54 | 59 | 57 | | | | | 39* |

*Estimated from partial records.

**Table 26.**—Mean monthly soil temperature at a depth of 10 inches for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | | |
| 1975 | | | | | | 46 | 58 | 53 | 50 | 42 | 35 | 31 | 41* |
| 1976 | 30 | 31 | 30 | 34 | 46 | 49 | 56 | 55 | 50 | 42 | 34 | 31 | 41 |
| 1977 | 29 | 30 | 31 | 38 | 47 | 55 | 57 | 57 | 50 | 43 | 35 | 32 | 42 |
| 1978 | 32 | 31 | 31 | 37 | 41 | 50 | 55 | 57 | | | 37 | 36 | 41* |
| 1979 | 35 | 34 | 34 | | | 54 | | | | | | | |
| 1980 | | | | | | 54 | 57 | | | | 41 | | |
| 1981 | | | | | 51 | 52 | 56 | | | 45 | 41 | 36 | 44* |
| Uncut | | | | | | | | | | | | | |
| 1974 | | | | | | 59 | 61 | 60 | 52 | 45 | 40 | 36 | 45* |
| 1975 | 35 | 34 | 35 | 35 | 40 | 48 | 58 | 54 | 51 | 44 | 38 | 34 | 42 |
| 1976 | 33 | 32 | 36 | 37 | 46 | 50 | 58 | 59 | 56 | 48 | 41 | 37 | 44 |
| 1977 | 33 | 34 | 35 | 39 | 45 | 55 | 57 | 59 | 53 | 47 | 39 | 37 | 44 |
| 1978 | 36 | 36 | 36 | 40 | 45 | 52 | 57 | 58 | 52 | | | | 44* |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | 53 | 46 | 41 | 35 | 33 | 39* |
| 1975 | 30 | 31 | 31 | 31 | 35 | 46 | 55 | 52 | 50 | 43 | 37 | 35 | 40 |
| 1976 | 34 | 34 | 35 | 34 | 43 | 48 | 56 | 57 | 53 | 45 | 38 | 35 | 43 |
| 1977 | 34 | 33 | 34 | 35 | 44 | 53 | 56 | 57 | 51 | 43 | 37 | 35 | 43 |
| 1978 | 35 | 35 | 34 | 35 | 42 | 48 | 54 | 54 | 50 | 45 | | | 42* |
| Clearcut | | | | | | | | | | | | | |
| 1974 | | | | | | 51 | 49 | | | 37 | 33 | 32 | 40* |
| 1975 | 31 | 31 | 30 | 32 | 36 | 46 | 58 | 53 | 48 | 39 | 32 | 31 | 39 |
| 1976 | 31 | 31 | 31 | 30 | 45 | 49 | 59 | 58 | 53 | 42 | 36 | 32 | 41 |
| 1977 | 32 | 32 | 33 | 36 | 47 | 59 | 60 | 59 | 51 | 42 | 34 | 33 | 43 |
| 1978 | 33 | 33 | 32 | 33 | 42 | 52 | 58 | 58 | 50 | 41 | 35 | 34 | 42 |
| 1979 | 34 | 33 | 32 | | | 47 | | | 48* | 42 | 33 | 32 | 40* |
| 1980 | 32 | 32 | 32 | 33 | 43* | 48 | 51 | | | 41 | 34 | 32 | 40* |
| 1981 | 32 | 32 | 32 | | 43 | 45 | 50 | | | 38 | 35 | 33 | 40* |

*Estimated from partial records.

Table 27.—Mean monthly soil temperature at a depth of 20 inches for residue utilization study sites (°F)

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection | | | | | | | | | | | | | |
| 1975 | | | | | | 44 | 52 | 51 | 49 | 44 | 37 | 33 | 41* |
| 1976 | 33 | 31 | 30 | 32 | 43 | 46 | 52 | 54 | 51 | 45 | 38 | 35 | 41 |
| 1977 | 32 | 32 | 33 | 37 | 45 | 52 | 54 | 56 | 52 | 46 | 38 | 35 | 43 |
| 1978 | 35 | 34 | 33 | 37 | 42 | 48 | 54 | 56 | | | | | 42* |
| Uncut | | | | | | | | | | | | | |
| 1974 | | | | | | 55 | 56 | 56 | 52 | 47 | 42 | 37 | 45* |
| 1975 | 36 | 35 | 35 | 35 | 39 | 46 | 55 | 54 | 52 | 47 | 40 | 37 | 43 |
| 1976 | 36 | 34 | 34 | 35 | 41 | 45 | 51 | 53 | 52 | 47 | 42 | 37 | 42 |
| 1977 | 33 | 32 | 34 | 37 | 44 | 50 | 53 | 57 | 53 | 47 | 41 | 38 | 43 |
| 1978 | 38 | 37 | 38 | 40 | 45 | 49 | 54 | 55 | 53 | | | | 45* |
| Shelterwood | | | | | | | | | | | | | |
| 1974 | | | | | | | | 49 | 46 | 41 | 37 | 35 | 40* |
| 1975 | 34 | 32 | 32 | 32 | 35 | 43 | 51 | 50 | 48 | 43 | 38 | 34 | 39 |
| 1976 | 34 | 34 | 34 | 32 | 39 | 44 | 51 | 54 | 53 | 47 | 41 | 37 | 42 |
| 1977 | 36 | 36 | 35 | 36 | 43 | 50 | 54 | 56 | 51 | 45 | 40 | 38 | 43 |
| 1978 | 37 | 37 | 36 | 35 | 41 | 47 | 52 | 54 | 50 | 46 | | | 42* |
| Clearcut | | | | | | | | | | | | | |
| 1974 | | | | | | 46 | 46 | | | 38 | 36 | 34 | 40* |
| 1975 | 33 | 33 | 31 | 33 | 34 | 42 | 51 | 50 | 46 | 41 | 35 | 33 | 39 |
| 1976 | 33 | 33 | 32 | 31 | 40 | 44 | 52 | 52 | 49 | 42 | 36 | 34 | 40 |
| 1977 | 33 | 32 | 33 | 33 | 42 | 50 | 52 | 53 | 48 | 42 | 36 | 34 | 41 |
| 1978 | 34 | 34 | 33 | 33 | 39 | 47 | 53 | 54 | | | | | 41* |

*Estimated from partial records.

**Table 28.**—Mean daily wind run by month for residue utilization study sites (mi/h) at 10 feet

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection-N[1] | | | | | | | | | | | | |
| 1975 | | | | | | 1 | 2 | 1 | 1 | 1 | 1 | 1 |
| 1976 | 1 | 1 | 1 | 1 | 2 | 1 | | 2 | 1 | 1 | | |
| Group Selection-D[1] | | | | | | | | | | | | |
| 1975 | | | | | | 2 | 2 | 1 | 2 | 1 | 1 | 1 |
| 1976 | 1 | 2 | 2 | 2 | 2 | 2 | | 2 | 1 | 1 | | |
| Uncut-N | | | | | | | | | | | | |
| 1973 | | | | | | | | | 0 | 0 | | 0 |
| 1974 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 |
| 1975 | 0 | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| 1976 | 1 | 1 | 1 | 1 | | | | | | | | 1 |
| 1977 | 0 | 1 | 1 | 1 | | | | | | | | |
| Uncut-D | | | | | | | | | | | | |
| 1973 | | | | | | | | | 1 | 0 | | 0 |
| 1974 | 1 | 0 | 1 | 1 | 1 | | 1 | 0 | 0 | 0 | 0 | 0 |
| 1975 | 1 | | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | | |
| 1976 | 1 | 1 | 1 | 1 | | | | | | | | 1 |
| 1977 | 0 | 1 | 1 | 1 | | | | | | | | |
| Shelterwood-N | | | | | | | | | | | | |
| 1974 | | | | | | | | 1 | 1 | 1 | 1 | 0 |
| 1975 | | 0 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 |
| 1976 | 1 | | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Shelterwood-D | | | | | | | | | | | | |
| 1974 | | | | | | | | 2 | 2 | 1 | 1 | 0 |
| 1975 | | 1 | 1 | 1 | 1 | 2 | | 2 | 2 | 1 | 1 | 1 |
| 1976 | 1 | | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 |
| Clearcut-N | | | | | | | | | | [2] | | |
| 1973 | | | | | | | | | | 0 | 1 | 0 |
| 1974 | | | | 0 | 0 | 1 | 0 | | | 2 | 1 | 1 |
| 1975 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 1976 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 1977 | 1 | 2 | 2 | 2 | | | | | | | | |
| Clearcut-D | | | | | | | | | | [2] | | |
| 1973 | | | | | | | | | | 0 | 1 | 0 |
| 1974 | | | | 1 | 1 | 1 | 1 | | | 2 | 1 | 1 |
| 1975 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 1 |
| 1976 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | 1 |
| 1977 | 1 | 1 | 2 | 2 | | | | | | | | |

[1]N = night period is 0100-0700 and 1900-2400.
D = daylight hours are 0800-1800.
[2]Period before cutting.

**Table 29.**—Mean daily wind azimuth by month for residue utilization study sites at 10 feet

| Site | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group Selection-N[1] | | | | | | | | | | | | |
| 1975 | | | | | | SW | SW | W | W | SW | SW | S |
| 1976 | SW | SW | SW | SW | SW | SW | W | W | W | S | | |
| Group Selection-D[1] | | | | | | | | | | | | |
| 1975 | | | | | | SE | SE | S | S | SW | S | S |
| 1976 | S | SE | SE | SE | SE | SE | SE | S | SE | S | | |
| Uncut-N | | | | | | | | | | | | |
| 1973 | | | | | | | | | SW | W | | W |
| 1974 | SW | S | S | S | SW | SW | S | S | SW | SW | W | SW |
| 1975 | SW | | W | SW | W | W | S | W | W | W | | |
| 1976 | W | SW | W | W | | | | | | SW | | W |
| 1977 | SW | W | SW | W | | | | | | | | |
| Uncut-D | | | | | | | | | | | | |
| 1973 | | | | | | | | | S | S | | SW |
| 1974 | SW | S | S | S | SE | SE | SE | SE | SE | S | SW | SW |
| 1975 | W | | S | S | SE | S | S | SW | SW | SW | | |
| 1976 | SW | SW | S | S | | | | | | SE | | SW |
| 1977 | S | SW | S | S | | | | | | | | |
| Shelterwood-N | | | | | | | | | | | | |
| 1974 | | | | | | | | SW | SW | SW | SW | SW |
| 1975 | | SW | S | S | S | SW | | W | SW | SW | SW | S |
| 1976 | SW | S | SW | SW | SW | SW | W | SW | W | W | W | SW |
| Shelterwood-D | | | | | | | | | | | | |
| 1974 | | | | | | | | E | SE | SE | S | S |
| 1975 | | SE | E | E | SE | SE | | SE | SE | SE | S | SE |
| 1976 | SW | SE | E | SE | SE | E | E | E | S | S | SW | W |
| Clearcut-N | | | | | | | | | | [2] | | |
| 1973 | | | | | | | | | | S | SE | S |
| 1974 | | | | SW | SW | S | SW | | | W | S | S |
| 1975 | SW | S | SW | S | S | SW | SW | SW | SW | SW | S | S |
| 1976 | SW | S | S | S | S | S | SW | SW | SW | SW | SW | SW |
| 1977 | SW | S | S | SW | | | | | | | | |
| Clearcut-D | | | | | | | | | | [2] | | |
| 1973 | | | | | | | | | | S | SE | SW |
| 1974 | | | | S | S | S | SE | | | S | SE | SE |
| 1975 | S | SE | S | S | SE | SE | E | SE | S | S | S | SE |
| 1976 | S | S | SE | SE | E | E | E | SE | SE | SE | S | S |
| 1977 | S | S | S | SW | | | | | | | | |

[1]N = night period is 0100-0700 and 1900-2400.
D = daylight hours are 0800-1800.
[2]Period before cutting.



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Hungerford, Roger D.; Schlieter, Joyce A. Weather summaries for Coram Experimental Forest, northwestern Montana—an International Biosphere Reserve. General Technical Report INT-160. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station; 1984. 34 p.

Presents weather data summaries (1934–82) for most of the weather stations within the Coram Experimental Forest (a Biosphere Reserve) in northwestern Montana and for three stations adjacent to the Forest. These data aid in the interpretation of silvicultural and other biological research, particularly the relationships of climatological variations to forest growth and productivity.

KEYWORDS: climate, weather, temperature, precipitation, solar irradiance, frost-free, northwestern Montana, Biosphere Reserve

The Intermountain Station, headquartered in Ogden, Utah, is one of eight regional experiment stations charged with providing scientific knowledge to help resource managers meet human needs and protect forest and range ecosystems.

The Intermountain Station includes the States of Montana, Idaho, Utah, Nevada, and western Wyoming. About 231 million acres, or 85 percent, of the land area in the Station territory are classified as forest and rangeland. These lands include grasslands, deserts, shrublands, alpine areas, and well-stocked forests. They supply fiber for forest industries; minerals for energy and industrial development; and water for domestic and industrial consumption. They also provide recreation opportunities for millions of visitors each year.

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